GENERAL LIBRARY
FEB 10 1919
UNIV. OF MICH.

GAS JOURNAL

LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

Vol. CXLIV. No. 2903.] LONDON, DECEMBER 31, 1918. [70th Year. Price 6d.

OXIDE OF IRON
SPENT OXIDE

GAS PURIFICATION AND CHEMICAL CO., Ltd.
PALMERSTON HOUSE, LONDON, E.C. 2.
Telegrams: "PURIFICATION, LONDON."
Telephone: 9144 London Wall.

PUMPING ENGINES
All Types for ACID, &c.
CAST-IRON OR STEEL TANKS
Any Capacity.
CHEMICAL PLANT.
Roofs and Girders. Structural Work.
SULPHATE OF AMMONIA PLANT
Air and Gas Compressors.
MIXERS.
TAR STILLS AND CONDENSERS.
W. NEILL & SON, Ld.
Engineers, Iron & Brass Founders,
ST. HELENS JUNCTION.
Telegrams: 'Neill, St. Helens.' Telephone No. 20.

PURIFYING MATERIAL
"Brownox-de-Luxe."
Unqualified Satisfaction given where used.
SPENT OXIDE PURCHASED
J. BROWN & CO., Ltd.
Savile Town, DEWSBURY.

TORBAY
JOINT STOPPING
FREE FROM LEAD.
The TORBAY PAINT CO.,
26/28, Billiter St., LONDON, E.C. 3.
39/41, Old Hall St., LIVERPOOL.

"BLUEBELL"
SILICA RETORTS
(95% SILICA)
John G. Stein & Co., Ltd.,
Castlecary, SCOTLAND.

Makers of
GASHOLDERS,
TANKS (C.I. or Steel),
PURIFIERS,
WASHERS,
ROOFS,
&c.
ASHMORE, BENSON, PEASE & CO., Ltd.,
STOCKTON-ON-TEES.
Complete GAS WORKS
London Office
39, Victoria Street, Westminster, S.W.
Telegrams: "GASHOLDER."

JAMES McKELVIE & CO.
Coal Owners,
Gas and Steam Coal Contractors,
17, RUTLAND SQUARE, EDINBURGH.
89, MARK LANE, LONDON, E.C.
GUILDHALL CHAMBERS, SANDHILL, NEWCASTLE-ON-TYNE.
24, CHAPEL STREET, LIVERPOOL.
ESTABLISHED 1840.

W. & B. COWAN
(Incorporated in Parkinson and W. & B. Cowan, Ltd.),
LONDON. MANCHESTER. EDINBURGH. GLASGOW.
SYDNEY. MELBOURNE. BRISBANE. WELLINGTON, N.Z.
(See Advertisement on page iii. of Wrapper.)

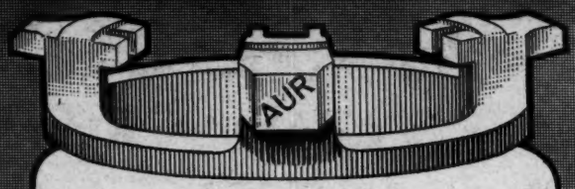
STEWARTS AND LLOYDS, LIMITED, 41, OSWALD STREET, GLASGOW. BROAD STREET CHAMBERS, BIRMINGHAM.
TUBES & FITTINGS for Gas, Steam, Water, &c.

ESTABLISHED — 1861 —
Telegrams: "DRY METERS, LONDON."
Telephone: KENSINGTON, 1140.

George Glover and Co., Ltd.
RANELAGH WORKS
Royal Avenue, Chelsea
LONDON, S.W., 3.

Highest Awards at the Principal International Exhibitions.
Branches at LEEDS (9, Dewsbury Road) and MANCHESTER (Gaythorn Meter Works, Easton St.).

SPECIALISTS IN DRY GAS METERS—SLOT, KEY, AND ORDINARY.
Every meter leaving George Glover and Co.'s works, irrespective of size—and they build up to 3000 Lights—is regulated and tested for soundness at 12 in. pressure, and for registration not only at the ½ in. pressure prescribed by the "Sales of Gas Act," but at 3 in. pressure with full outlet capacity, so as to prevent "slow" registration even when the meter is overworked.
AGENTS FOR THE PATENT M. & M. SELF-LOCKING SLOT METER PADLOCK.



The Welsbach Light Co., Ltd.

THE
WELSBACH
LIGHT CO., LTD.
Welsbach House,
KING'S CROSS,
London, W.C.1
There Are No Better Mantles Made

is an ALL British Company

The Welsbach Factory produces the largest number of Mantles of all Factories in the United Kingdom.

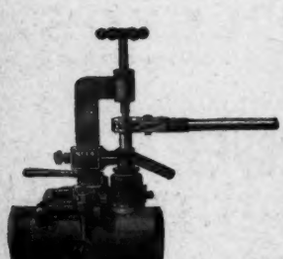
SERVICE CLAMPS, TAPPING & DRILLING MACHINES,

For Steel or Cast Iron Mains.

Century Pattern.

Every Drilling Machine unconditionally guaranteed.

High Pressure Gas Service Set.

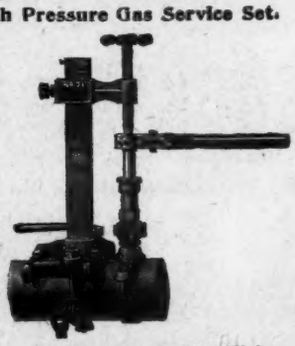


No. 14. For Tapping Dead or Live Low-Pressure Mains.

MUELLER HIGH-PRESSURE GAS COCKS, Extra heavy Type.

No. 19. For Drilling High-Pressure Gas Mains or Water Mains.

DISTRICT AND SERVICE REGULATORS.



No. 21. For Drilling High-Pressure Gas Mains or Water Mains.

Sole European and Colonial Licensees—

THE BRYAN DONKIN CO., LTD., Engineers, CHESTERFIELD.

London Office: 3, VICTORIA STREET, WESTMINSTER, S.W. 1.

Chesterfield Telephone No. 84.
London Telephone No. 5358 Victoria.

Chesterfield Telegrams, "Donkin Chesterfield."
London Telegrams, "Donkin Vic. London."

GAS JOURNAL

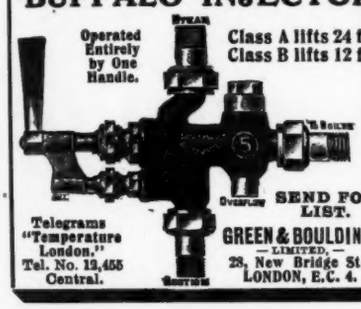
LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

VOL. CXLIV. No. 2903.] LONDON, DECEMBER 31, 1918. [70TH YEAR. PRICE 6d.

THOMAS DUXBURY & CO.,
16, DEANSGATE, MANCHESTER,
Gas Engineers' Agents and Contractors for METERS, FIRE-CLAY GOODS, OXIDE OF IRON, AND ALL OTHER GAS APPARATUS.
Inquiries Solicited.
Telegrams—"DARWINIAN, MANCHESTER."
Telephone—3268 & 3269 City (two lines).

'BUFFALO' INJECTOR



Operated Entirely by One Handle.
Class A lifts 24 ft.
Class B lifts 12 ft.
SEND FOR LIST.
Telegrams "Temperature London." Tel. No. 12,455 Central.
GREEN & BOULDING, — LIMITED, — 28, New Bridge St., LONDON, E.C. 4.

THOMAS TURTON AND SONS, LIMITED,
SHEAF WORKS, SHEFFIELD,
MANUFACTURERS OF
FILES OF BEST QUALITY
FOR ENGINEERS.
STEEL OF ALL DESCRIPTIONS.
SCREW STOCKS, TAPS AND DIES, SPANNERS, RATCHET BRACES, LIFTING JACKS, ANVILS, VICES, AND ENGINEERS' TOOLS GENERALLY.
London Office:
90, CANNON STREET, E.C.

CAST IRON PIPES
FOR
GAS, WATER, & STEAM
1½in to 12in. BORE.
THOS. ALLAN & SONS, LTD.,
Bonlea Foundry,
THORNABY-ON-TEES.
Telegrams: "BONLEA, THORNABY-ON-TEES."

HARRIS & PEARSON,
STOURBRIDGE, ENGLAND.
MANUFACTURERS OF
FIRE-CLAY GAS-RETORTS, FIRE-BRICKS, LUMPS, & TILES of Every Description.
GLAZED BRICKS AND PORCELAIN BATHS.

CARLESS, CAPEL & LEONARD,
HOPE CHEMICAL WORKS, HACKNEY WICK, LONDON, N.E.
And at PHAROS WORKS, HACKNEY WICK.
NAPHTHA AND GASOLINE DISTILLERS AND PETROLEUM IMPORTERS,
Specially distil Carburine Spirit, Specific gravity ·680, or of any other grade suitable for Enriching Gas, also Gas Oil best adapted for injecting into the Retorts, as in the Herring Process.
Importers of Petroleum for Carburetting Water Gas, or for Manufacturing Oil Gas. Distillers of Pentane, Petroleum Ether, and Naphtha for clearing the pipes of Naphthalene, &c.
Samples and Prices may be had on application.

GOODALL, CLAYTON, & CO., LTD.,
WORKS: **LEEDS.**
Telephone No.: 20,264-5.
Builders of Complete Installations of—
INCLINED AND HORIZONTAL RETORT BENCHES, COAL AND COKE HANDLING PLANTS, CONVEYORS, ELEVATORS, ROOFS, BUNKERS, COAL BREAKERS, HOISTS, &c.
Licensees of The Vertical Gas Retort Syndicate, Ltd., London, for complete
INTERMITTENT VERTICAL RETORT INSTALLATIONS.

CHAMBER CARBONIZATION

WITH

KOPPERS' CHAMBER OVENS

IS THE MOST EFFICIENT AND MOST ECONOMICAL SYSTEM OF GAS PRODUCTION.

KOPPERS' PROCESS

OF

DIRECT RECOVERY OF AMMONIA FOR GAS-WORKS.

In this system the scrubbing process is entirely dispensed with, and the Ammonia is recovered direct from the Gas in the form of Sulphate.

ADVANTAGES OF KOPPERS' DIRECT RECOVERY PROCESS.

INCREASED YIELD OF SULPHATE.
GREAT SAVING IN STEAM CONSUMPTION.
REDUCTION IN WATER CONSUMPTION.
PLANT IS SIMPLE TO OPERATE.
EFFLUENT LIQUOR REDUCED TO A MINIMUM.
EXCELLENT QUALITY OF SULPHATE PRODUCED

FULL PARTICULARS ON APPLICATION TO THE

KOPPERS' COKE OVEN & BYE-PRODUCT CO.,

301, GLOSSOP ROAD, SHEFFIELD.

Telephone: No. 1331 (two lines). Telegrams: "KOCHS SHEFFIELD."

CURTIS'S & HARVEY, LTD

GAS MANTLES

The largest manufacturers of Gas Mantles in the British Empire.

ENTIRELY **BRITISH.**

MANTLES FOR ALL SYSTEMS of High and Low Pressure Gas Lighting.

PROPRIETARY BRANDS— "Ironclad," "Evening Star," "Iris," "Dreadnought," "Aladdin," &c.

Specially Manufactured for Gas Companies. **Unequalled for strength and durability.**

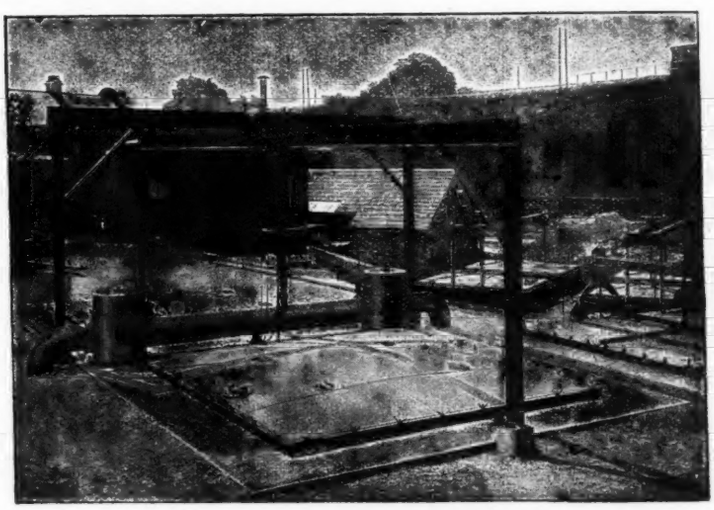
Head Office: CANNON STREET HOUSE, E.C. 4.

Factories: **DARTFORD (Kent) & EARLSFIELD (London).**

APPARATUS for the MANUFACTURE of COAL GAS, COKE OVENS, CHEMICAL PLANT, &c.

Also Makers of HUMPHREYS and GLASGOWS' C.W.G. PLANT

RIVETTED and LAP-WELDED STEEL TUBES.



GASHOLDERS WITH EITHER EXTERNAL GUIDE-FRAMING or on BARKER'S PATENT SPIRAL PRINCIPLE.

PIGGOTT'S PATENT PRESSED STEEL TANKS.

PRICES ON APPLICATION.

THOMAS PIGGOTT & CO., Ltd.,

Atlas Works, BIRMINGHAM.

Telegrams—"ATLAS, BIRMINGHAM.
Telephone—3922 Central (4 lines).

London Office—
63, QUEEN VICTORIA STREET, E.C.

GEO. KENT LTD.

IRON AND BRASS FOUNDERS AND GENERAL ENGINEERS.

STATION AND DISTRICT

GAS METERS.

REGISTRATION BY DIAGRAM, SHOWING VARIATION IN CONSUMPTION.

REGISTRATION BY COUNTER, SHOWING TOTAL CONSUMPTION, OR

COMBINED DIAGRAM AND COUNTER RECORDER.

COLD AND HOT WATER METERS, STEAM AND AIR METERS.

LEVEL RECORDERS OF EVERY DESCRIPTION.

HEAD OFFICES:- 199 HIGH HOLBORN, LONDON.

FOUNDRIES AND WORKS. LONDON AND LUTON.

Manufacturers of Incandescent Gas Mantles,

KNITTING, AND SOFT MANTLES.

Telephone— Hop. 616.

Three Qualities printed in BLUE (1 Ply.) RED (2 Ply.) GREEN (3 Ply.)

Guaranteed tested at a pressure of 20 lbs.

Best Silk RAMIE YARN.

BRIGHTEST WHITE LIGHT.

MADE BY HAND.

Managing Director, E. GOSSIEAUX (Belgian).

SAMPLES AND PRICE LISTS ON APPLICATION.

SPECIALITY of UPRIGHT and INVERTED MANTLES for PUBLIC LIGHTING.

ASTRA LIGHT COMPANY, LTD.,

365, Southwark Park Road, LONDON, S.E. 16.

SPECIALISTS IN BLOWPIPES

for AEROPLANE WORK, TOOL MAKING, GLASS WORKING, &c.

FLETCHER, RUSSELL & CO., LTD. - Palatine Works, - WARRINGTON.

LINDSAY THORIUM

is NOT made from Brazilian Monazite Sand. LINDSAY use exclusively sand which comes from the

BRITISH EMPIRE (India).

Sole Agents for Europe:

PAUL WINN & CO., LTD.,

Telegrams: "Snowwhite, Fen. London." 72, MARK LANE, E.C.3. Telephone: Avenue 4122, 4123.

HARDMAN & HOLDEN, LTD., MANCHESTER.

Telegraphic Addresses: "BENZOLE, MANCHESTER," "BENZOLE, BLACKBURN," "OXIDE, MANCHESTER."

Telephones: Manchester—Miles Platting and Clayton { City 8666 (3 lines). Oxide, 2369 City Manchester. Blackburn, 6295 Blackburn.

All Bye-Products from the Distillation of Coal dealt with.

SPECIALITIES { Hydrated Oxide of Iron for Gas Purification, and of different Strengths to suit conditions of Purification, Sulphuric Acid (free from Arsenic) for Sulphate of Ammonia Manufacture, Recovered Sulphur, and Prussiates of Soda, Spent Oxide bought on Sulphur and Cyanide Contents, Tar and Gas Liquor purchased. *See our Advertisement last week.*

JOHN BROWN & CO., LTD., Colliery Offices: ROUNDWOOD, Nr. ROTHERHAM.

OWNERS OF THE FAMOUS

Aldwarke, Rotherham, & Dalton Main Gas Coals

As used by the principal Gas Companies of the World.

ALSO PRODUCERS OF THE BEST SOUTH YORKSHIRE ASSOCIATED HARDS (BARNSLEY BED).

TELEGRAPHIC ADDRESS: "ROUNDWOOD, ROTHERHAM." TELEPHONE: ROTHERHAM 226.

NEWTON, CHAMBERS, & CO., LIMITED.

THORNCLIFFE IRON-WORKS, near SHEFFIELD.

LONDON OFFICE: **Brook House, 10-12, Walbrook, LONDON, E.C.**

Telegraphic Addresses: "NEWTON, SHEFFIELD," "ACCOLADE, LONDON." *National Telephone No. 2200.*

GAS ENGINEERS, IRONFOUNDERS, and CONTRACTORS.

MANUFACTURERS OF EVERY DESCRIPTION OF

PLANT, APPARATUS, AND MACHINERY FOR GAS AND CHEMICAL WORKS.
RETORTS AND FITTINGS, MOUTHPIECES WITH SELF-SEALING LIDS.
IMPROVED COAL AND COKE HANDLING PLANT, CONVEYORS, AND ELEVATORS,
CONDENSERS, SCRUBBERS, AND WASHERS.

PURIFIERS with Planed Joints a Speciality.

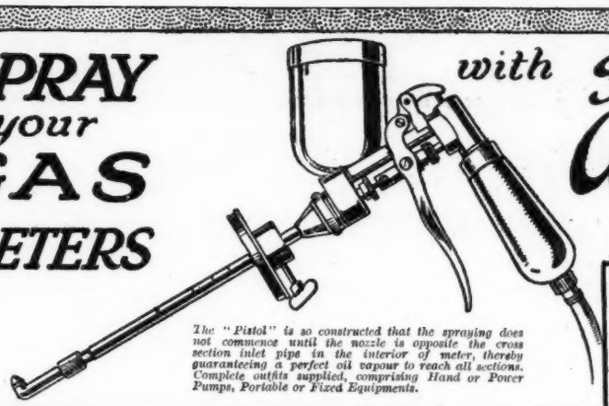
PATENT CENTRE-VALVES, RACK AND SCREW VALVES, WOOD GRIDS AND SCRUBBER-BOARDS, CAST-IRON MAINS, AND SPECIALS.
STRUCTURAL WORK, COLUMNS, GIRDERS AND ROOFING.
GASHOLDERS, CAST-IRON OR STEEL TANKS.

DESIGNS, SPECIFICATIONS, and ESTIMATES FREE.

PIG IRON (special quality) for Engine Cylinders. **GAS COAL** famous for its Unrivalled excellence.

Established 1793.

SPRAY your GAS METERS with The Aerograph REGD TRADE MARK OIL ATOMISER



The "Pistol" is so constructed that the spraying does not commence until the nozzle is opposite the cross section inlet pipe in the interior of meter, thereby guaranteeing a perfect oil vapour to reach all sections. Complete outfits supplied, comprising Hand or Power Pumps, Portable or Fixed Equipments.

Infinite trouble with gas meters is caused by the valves, leathers, and mechanism becoming corroded. Spraying with the Aerograph (regd.) Oil Atomiser effectually removes the trouble, restores the normal working of the meter, and causes it to register correctly.

Complete details by return of post.

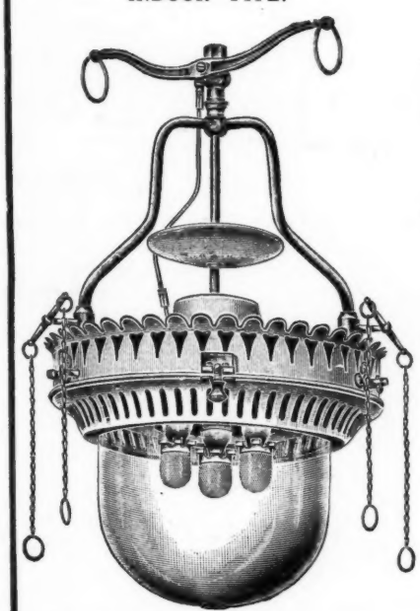
THE AEROGRAPH COMPANY, LTD.,
48, HOLBORN VIADUCT, LONDON, E.C. 1.

The Original Makers and Pioneers of Spraying Equipments. British from the First. Established 1893.

J. & W. B. SMITH, Ltd.

(ESTABLISHED 1839.)

INDOOR TYPE.



ALSO MADE FOR OUTDOOR USE.

We are now in a position to give

IMMEDIATE DELIVERY

of our well-known

'SILVA' LAMPS

BRITISH MADE THROUGHOUT.

The most satisfactory Gas Lamps made for Lighting all Large Areas. On the Hire Purchase and Maintenance List of the Large Gas Undertakings throughout the United Kingdom.

15, 17, 19, 21 & 23, Farringdon Road, London, E.C. 1.

COAL TAR AND AMMONIA PRODUCTS.

Benzole, Toluole, Solvent Naphtha, Creosote Oils, Grease Oils, Carbolic Acid, Dark Cresylic Acid, Granulated (Crude) and Sublimed Naphthalene, Beta Naphthol, Anthracene, Refined Tar and Pitch. Sulphate of Ammonia containing a Guaranteed Minimum of 25 per cent. Ammonia.

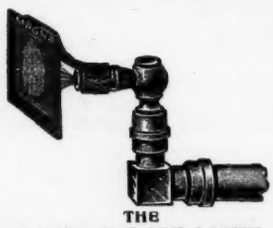
For Prices apply to the SOUTH METROPOLITAN GAS COMPANY,

Telegraphic Address
Inland: "Metrogas, Peck, London."
Foreign: "Metrogas, London."

709, Old Kent Road, LONDON, S.E. 15.

50 HOURS' LIGHT FOR 1D.

SAVES GAS
SAVES COAL



THE
MAGNA MIDGET LIGHT
burns in any position, fits any fittings.
Retail 1/- each.

Appeals at sight to gas users; it saves their pockets, and meets the national need for fuel and light economy at one and the same time.

Gives a bright light, quite sufficient for halls, landings, staircases, bedrooms, bathrooms, and other places.

Consumes only half a cubic foot of gas per hour, and therefore, reckoning gas at 3/4 per thousand, give 50 hours of good light for a penny.

An ideal burner for slot meters.

Mantle frames are now fitted with 2 mantles, which increases candle-power and life of the mantles. PILLER ADAPTERS, 4d. each.

Sample sent to the trade only in exchange for one shilling including postage. *Good discounts to factors and dealers.*

Manufactured by PATENTED AND REGISTERED.

E. A. WOOD, BIRMINGHAM & GLASGOW.
Aston Road. 28/36 East Nile St.

Workmanship and Materials of the Highest Quality.

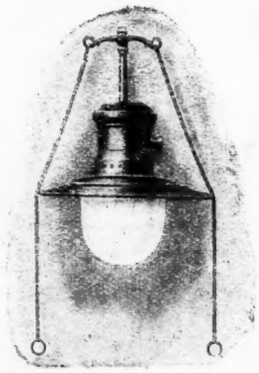
PECKETT'S LOCOMOTIVES.

Built to any Specification or Gauge.

PECKETT & SONS, LTD.,
ATLAS LOCOMOTIVE WORKS, BRISTOL.

The best of H.P. Gas Appliances

now can be obtained promptly.

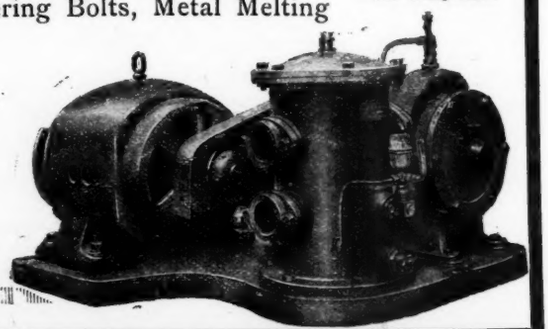


A typical Tilley H.P. Gas Fitting for Inside Lighting.

With the return of peace we are able to devote ourselves once more to the production of Tilley High Pressure Gas Lighting Fittings and Appliances. During the period in which we have been engaged on war work important additions have been made to our plant, the result of which will be an increase in our output.

Immediate inquiries are invited for H.P. Gas Fittings (we have types for all purposes), Gas Compressors, Soldering Stoves—both H.P. and L.P. patterns —Gas-Heated Soldering Bolts, Metal Melting Furnaces, &c.

Tilley Automatic Gas Compressor.



If you write for our list this will be sent you at once.

TILLEY HIGH PRESSURE GAS SYNDICATE, LTD.
53, Kingsland Road,
LONDON, E. 2.

E.I.H.

CONTENTS.

EDITORIAL NOTES.

1918—A Retrospect 695
In the New Parliament—Other Members—Gas Coal Stocks at a Low Level 709
Revocation of an Order Cancelled by Another—Oil Fuel in the Boiler-House — Last Year's Coal Mines Report. 710

Personal 710
Obituary. 710
National Gas Council—Minutes of the Executive Committee 711
Electricity Supply Memoranda 711
Coal Statistics for 1917—Annual Home Office Report. 713
Sixty Years Ago 713
Gas-Furnaces at Manchester (British Scientific Products) Exhibition 714
Coke-Oven Managers' Association—Discussion on Mr. Smith's Paper on the Effects of Ammonia Recovery 714
Tars and Tar Oils for Diesel Engines—An American Bulletin 715
Meeting After-War Demands 716

CORRESPONDENCE.

Temporary Increase of Charges Act . . . 717

MISCELLANEOUS NEWS.

Buenos Ayres Gas Scandal 717
Heywood Gas Department Annual Report of the Engineer. 717
Sheffield and Coke-Oven Gas 718
Submarine Main in San Francisco Bay . . 719
Current Sales of Gas Products 719
Stock Market Report 721

PARAGRAPHS.

The "Twi" Light. 710
Lignite in Gas-Producers. 711
The Refractory Materials (Maximum Prices) Order—Metropolitan Gas Referees' Notification 712
The "Curfew" Order at an End—Utilization of Waste Products 713
Increase in Price at Kingston-on-Thames . 717
Working Hours of Engineers 720
Double Fatality at St. John's Wood—Certified Undertakings and Women's Wages—Dundee Gas-Works and Oil Production—Fatal Accident at the Saltley Gas-Works . 721
Motor Spirit Restriction Orders—Edinburgh and the Calorific Standard—Gas Explosion at Goole—Irish Gas-Workers' Strikes—Coleraine Gas Supply Failure—Gas-Works and Armistice Allowances. 722

"JOURNAL" OFFICE TELEPHONE.

The "Journal" Office Telephone Number is "6857 Holborn."

HUMPHREYS & GLASGOW, LTD.,
AND
THE UNITED GAS IMPROVEMENT CO., U.S.A.

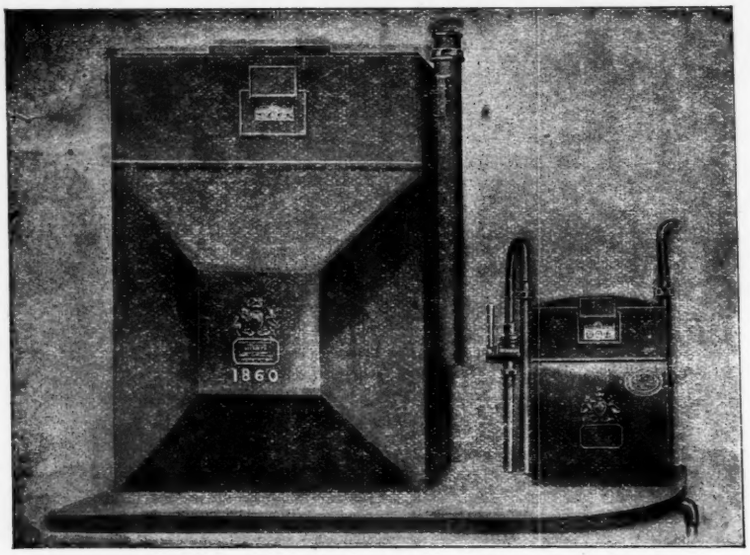
WATER GAS
BLUE *AND* CARBURETTED.

Humphreys & Glasgow, Ltd. 368,400,000 Cubic Feet Daily.
The U.G.I.Co., U.S.A. - - 777,900,000 Cubic Feet Daily.

OVER ONE THOUSAND MILLIONS CUBIC FEET DAILY.

38, VICTORIA STREET, LONDON, S.W.
Bureau de Bruxelles: 209, Chaussée D'Ixelles.

A RECORD.



100 lt. Meter fixed and in continuous use since 1860.

10 lt. Meter fixed and in continuous use since 1861.

DRY GAS METERS.

Since 1844 when we patented and commenced making Dry Meters we have made **and sold** nearly Two Millions of Dry Gas Meters.

We meet many of our early patterns after nearly Three Score Years of accurate work.

Were proof required of the widely known reliability of the **Thomas Glover** Meters, here is one of many.

Let us know of your requirements, and we will give you the best deliveries.

THOMAS GLOVER & CO., Ltd.

(Original Makers—Established 1844),

GOTHIC WORKS, ANGEL RD., EDMONTON, LONDON, N.18.

Telephone: 41 Tottenham (3 lines). Telegrams: "Gothic 'Phone, London."

London Show-Rooms: 25, PRINCES STREET, OXFORD CIRCUS, W.1.

Gothic Works, King Edward Road, BIRMINGHAM; 18, Severn Street, Deansgate, MANCHESTER; Gothic Ironworks, FALKIRK; 82, Gordon Street, GLASGOW; 97, Millfield, BELFAST; 333, Queen Street, MELBOURNE; and 12, Cunningham Lane, Pitt Street, SYDNEY.

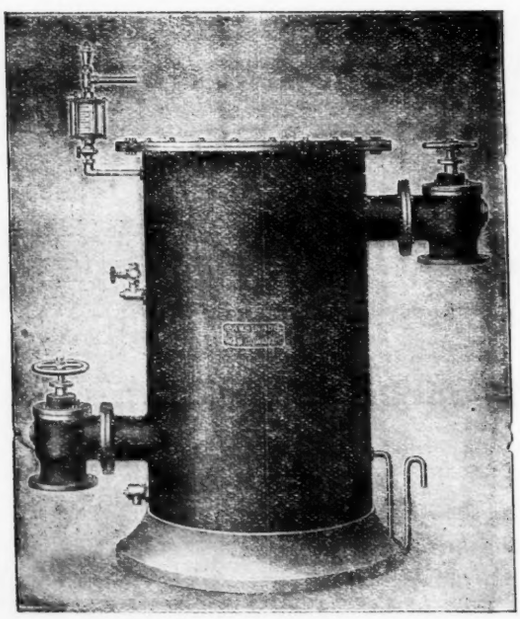
THE VAPOURISING OF OILS

IS GOOD FOR

Mains, Services, and Meters,

AS WELL AS FOR

NAPHTHALENE PREVENTION.



INSTALL A

PETROLEUM VAPOURISER.

FULL PARTICULARS FROM:—

W. PARKINSON & CO.,

(INCORPORATED IN PARKINSON AND W. & B. COWAN, LTD.)

COTTAGE LANE, CITY ROAD, LONDON.	BELL BARN ROAD, BIRMINGHAM.	HILL STREET, BELFAST.
Telegrams: "INDEX, LONDON."	"GASMETERS, B'HAM."	"PREPAYMENT, BELFAST."
Telephone Nos.: 7570 City.	2345 Midland, B'ham.	3374 Belfast.

GAS JOURNAL

LIGHT ✦ HEAT ✦ POWER ✦ BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON, E.C. 4.

VOL. CXLIV., No. 2903.] TUESDAY, DECEMBER 31, 1918. [70TH YEAR.

1918

A Retrospect.

ONE can start the retrospect this year with lighter heart. We have seen the end of the devastating hostilities, victory is with the Allies, and it is for them to dictate the terms of a just Peace; and a "just Peace" it will not be that does not compel the aggressors to meet to the full, or within the definitely ascertained limits of their capacity, the prodigious account their vile act of making war, and their methods of conducting it, have built up for them, and which account will be stamped and sealed by the recollection of deeds (continued to the end of the war) which the Germans themselves have firmly established in mind by their inhuman atrociousness and ferocity. The Central Powers will now learn that such methods of warfare do not pay, as they have already learnt that the doctrine of Might over Right is a vicious and an unsustainable one, and that the world domination of any one nation is an aspiration which other nations will not brook. For four years in succession, our annual retrospect has concluded with the hope that the year following would see the end, and that end a complete victory for the Allies, of this debauch of war, the fearful character of which was moulded by the enemy in a spirit that has for ever defiled the reputation of Germany. But the years passed, and the end was not then. When, at the close of the review of 1917, we wrote: "With the prayer on our lips that the terrible world catastrophe may soon end in victory for Truth, Justice, and an enduring Peace," no human imagination could have pictured the dramatic events that were to be pressed into the year then approaching, the heavy clouds that were in the Spring to envelop the Allies, to be later succeeded by victory upon victory for them, and then the almost sudden collapse of the arch-enemy. One by one the associated countries of the Central Powers pleaded for a cessation of hostilities; then Austria was defeated in the midst of a state of internal disintegration; and, finally, Germany, which is now in a state of political chaos, abandoned the struggle, defeated beyond power of recovery. Despots have been dethroned, and are now cursed and hated by the countries over which they formerly ruled. The truth is out. The enemy nations find they have been grossly deceived; and their former monarchs have endeavoured to place themselves beyond their vengeance while feelings are inflamed. Our Allies have once more entered into full possession of the territory of which they had been despoiled, and much of which has been terribly ravaged. All these matters are quite well known to readers; and it would be out of place here to go into details. But the year will stand out imposingly, and apart from all other years, for the remarkable part it has taken in shattering national constitutions, and in beginning to reshape them on new lines. To drop from these world-absorbing matters to the affairs of an industry which is only one member in a national system, although performing a multiplicity of service for the community, is a sharp descent. But this is our duty; and we must at once get to it, as the year is without compare in the intensity, the weight, and the variety of conditions which have fallen upon gas undertakings.

DIFFICULTIES AND COAL SUPPLIES.

During the year, the gas industry has been worked under a mass of difficulty, composed of everything which the most ingenious mind could conceive that would be calculated to bring about its undoing. The shortage and prices of coal, oil, and other materials; shortage and prices of labour; restrictions and regulations of every kind; interrogatories from, and correspondence with, Government Departments; forms amazing in number, character, and complexity; the deprivation of gas capital of reward except of an attenuated order that could only make the heart of the most rabid socialist rejoice, providing the capital was not his; and fuel and lighting rationing. The industry's difficulties and trials if all recounted would run to abnormal length. The coal difficulty had outstanding place, and many phases. All that the Coal Controller (Sir Guy Calthrop) had done prior to this year did not prevent worse happening, owing to a variety of circumstances, one of which was that the factor of safety had not been generously considered. Early in the year, there were some gas-works that were almost on their "uppers" in regard to coal stocks—a few days' supply only was reported in several cases. These were among the worst; but they indicate that in other works stocks had run down to a perilous state, and within measurable distance of a stoppage of the gas supply. By the Spring, things looked very ominous; and it was certain then that the year was going to be one that, in regard to coal, would require statesmanlike handling, or there would be grave disaster if relief of some sort did not arrive.

It was found imperatively necessary, in order to keep Italy in fighting trim, that coal should be supplied to it. The big German offensive brought certain coal-fields of Northern France under direct German domination, or within range of enemy guns. More coal had to go to France. Certain neutral countries, in exchange for shipping accommodation, had to be supplied with more coal. The American Expeditionary Force needed more. Concurrently, more miners had to be taken from the pits for military service. Ships bringing coal from North to South had to be commandeered for Continental supplies. These ships had been carrying some three million tons a year; and the railways could not cope with more than half the extra load put upon them. The outlook was an extremely grave one; but as to what was done in the way of attempting to ameliorate the position will be dealt with later. All parts of the United Kingdom felt the effects; and complaints of shortage of supplies were general. Distribution more than output was to blame. The redistribution scheme may have had effect in relieving ton-miles, and in making the conditions less acute than they would otherwise have been. But whatever its beneficent effect in this direction, redistribution was obtained at the expense of efficiency in other directions, as well as heavy cost. It therefore continued to be the cause of a good deal of grumbling. Not only did many undertakings obtain coal inferior in quality to that to which they had been accustomed, but many had to pay increased conveyance costs through having to go to other fields for supplies. Take Leeds, for example. The Gas Department had to pay 6s. per per ton for transit from Durham, so that the coal from West Yorkshire might be sent to London and the South.

When the accounts for the June half year were issued, it was seen that, compared with the corresponding date of 1917, coal stocks all over the country were very low. Mr. Robert Muir, in his Presidential Address to the North British Association, stated that returns from 122 gas-works in Scotland indicated that at the end of July this year the aggregate coal stocks showed a reduction of no less than 58 p.ct. The Coal Controller said in June that it would be impossible to build-up stocks this year at the same rate as in 1917. In the House, Sir Albert Stanley declared that in the winter through which we are passing the supply (as the situation then presented itself) would be at least 25 p.ct. less than it was last winter. The seriousness of the

position was much more palpable than were the measures for alleviation. The National Gas Council were constantly moving in the matter so far as gas-works were concerned; and Mr. Thomas Glover, the representative of the gas industry in the Coal Controller's Department, did his utmost to assist the industry in every possible way. But the conditions were adamant for a time. All that could be done with them was to struggle for the mitigation of their incidence. There was occasion for further annoyance when towards the end of the year—just after the announcement was made giving the gas industry liberty in the matter of benzol recovery—it was found that an official circular to collieries placed the gas and electrical industries seventh in order in a list of priority for deliveries. But the Hon. Secretary of the Institution of Gas Engineers (Mr. W. E. Price) informed us that the instructions had been revised, and gas and electricity coal supplies placed third. A list of gas and electricity works lately sent to collieries giving the position of their stocks showed there were 41 with under a week's supply, and 64 with under two weeks' stock. The Coal Controller reported that, in the first forty weeks of the year to Oct. 12, the output of coal had fallen, in contrast with the same period of last year, by 16½ million tons; while the reduced exports in the first half of the year only amounted to less than 3 million tons. While on the subject of exports, it may be mentioned that the total shipments of coal, coke, and patent fuel up to the end of October was 29,331,605 tons, compared with 32,619,757 tons in the corresponding period of 1917. Naturally, the coal owners are anxious to get rid of export control as early as possible. Away back in the Summer, a Committee of the Board of Trade (which Committee had a preponderance of representatives of the coal interests upon it) reported that the export coal trade should be restored as early as possible after the war, and the coal industry be allowed to develop it at its own sweet will. Perhaps a little consolation (though the coal people have been making a good financial reaping from the heavily reduced quantity shipped) will be found in the fact that the Coal Export Committee are now considering applications for licences for export to Holland until further notice; but licences are only being granted for shipment for steam and gas coal from Northumberland and Durham districts, and anthracite from South Wales. This is in fulfilment of the obligation incurred some months ago when Holland supplied ships which were urgently required for conveying troops abroad and for the transport of food to this country.

Methods of Relief.

But to revert to the attempts made to alleviate the coal situation. Towards the end of the year, a steady stream of miners was flowing back from the Army to the mines. This commenced before the armistice with Germany. Soon after the armistice was signed, the volume of the stream of returning miners was considerably increased. But it does not as yet appear that this reinforcement of mine labour is doing anything more than helping to meet the additional demand that came with the darker days and lower temperatures, although concurrently the needs for munition work began to wane. However, the conditions are such that it is hoped it can be said some relief is in sight. Before this, there were many suggestions—some adopted, some not—for securing palliation. One suggestion was that the Mines Eight Hours Act should be suspended. This was a proposal put forward at a meeting of the National Gas Council, and at other gas meetings and in other quarters. But the miners themselves stoutly resisted anything of the kind being done. A more practical proposal was that an effort should be made to stamp out avoidable absenteeism. The miners' leaders promised to take part in this. Pit Committees were formed; and reports from different centres gave some assurance of this being more effective. The Coal Controller appealed to the men to put in full time; and he calculated that an increased output of 10 cwt. of coal per week per man would result in a national increase of about 10 million tons per annum. In every way, attempts were made to arouse the men to a sense of their duty to the country and to the fighting forces. Mr. Gompers, the American labour leader, appealed to them. Some of the play time taken by the men was asserted to be due to their desire to escape the payment of income-tax. During the week of the armistice, nearly 2 million tons of output were lost. Despite the appeals to the men, too, there were during the year short-lived strikes here and there—one being the strike of Yorkshire miners in August over the question of whether an award that decreed a fifty-four hours' week for shopmen included meal hours.

Time slipped on; the summer days, when light helps transport, saw no great improvement in stocks. Some gas-works about September reported a slight improvement owing to the efforts being made; at others, the managers were never free from anxiety as to what would be their fate in the winter. The Coal Controller's office was bombarded with inquiries. Representatives of the National Gas Council were continually there. The Coal Controller was told point blank in a speech by Mr. Charles Carpenter, D.Sc., that if there was a breakdown this winter the responsibility would not be with the gas undertakings but with the Coal Controller himself. A deputation was at length informed that strong efforts—the Coal Controller himself mentioned the figures at the meeting of the Institution of Gas Engineers in June—would be made to put gas-works a distance from the coal-fields into possession of six weeks' stock, and nearer the coal-fields into possession of four weeks' stock. This attempt was seriously made; but reports of shortage still came from many quarters. Sir Albert Stanley said in the House that industries engaged in work of national importance must be assured an adequate supply of coal. Gas-works wish they had got it. Though to-day the gas industry cannot claim to be washing their gas for war purposes, they are still by doing so meeting a national requirement for benzol. In order to equalize matters in something like the proportion of output, the Coal Controller diverted coal supplies from those gas-works that had coal stock to those that were *in extremis*. At the Southern Association meeting in November, Mr. Thomas Glover and Mr. F. R. Goodrich gave some information as to stocks and diversions. Then it was stated that what were called August stocks were held in about 450 works out of 1500, and that during the preceding two months no less than 125,000 tons of coal had been diverted from gas-works to works where the stocks were low. But there was another form of diversion—that was of good gas coal to household grates and poor gas-making coal from household grates to gas-retorts. The stupidity of this was a point that Mr. S. O. Stephenson very strongly brought forward.

Gas-works were urged to do all possible to economize coal; but frequently the coal was not of an order to assist them to that end. What was done to increase gas production by steaming retorts is a matter for another part of the retrospect. The utilization of blue water gas was continued with very excellent effect; and in these directions, the Order that was issued in connection with gas washing—permitting the supply of coal gas which before washing was of 500 B.Th.U. gross, and mixed gas of 450 B.Th.U.—was very useful. The Coal Controller worked on the principle that every little would help. But some of the methods suggested to him were not very brainy. There were hundreds of suggestions made as to how to economize coal in the domestic fireplace—all good enough in their way; but to be effective millions of fireplaces would have had to be dealt with, and millions of fire-bricks, fireclay balls, and other devices, were not to be secured by the masses of the people. Collective cooking was also advocated; and the patronage of National Kitchens, which would have been unequal to any great demand, was urged. The Local Government Board besought local authorities to save coal in public buildings and in lighting the streets. Posters appeared on the hoardings inviting people to save coal, and assuring them that "coal is the key to victory." But victory is here; and so still is a bad coal situation.

The Fuel and Lighting Rationing Schemes.

But public interest in the matter of coal shortage became arrested and ultimately concentrated by the fuel and lighting rationing schemes to which the position gave birth. Before a first attempt was made, the Coal Controller—notwithstanding that the Explosives Supply Department were asking gas-works for greater outputs of benzol and other substances required for war purposes, the Admiralty for liquid fuel, and agriculture for sulphate of ammonia—was beseeching consumers to reduce their consumption, so as to lessen the use of coal at gas-works. His desire also included electricity. There were several threats that rationing would be resorted to if consumers did not comply; but no consideration appears to have been extended to the fact

that gas as a fuel limits the employment of labour for the carriage of solid fuel, and is a considerable aid in producing domestic labour economy. Sir Guy Calthrop, however, had his own views, and his own ends to serve. With the military position after the great German offensive in March, a crude rationing scheme for gas and electricity was introduced. It affected twenty-three counties south of a diagonal line drawn from the Wash to the Bristol Channel; the allowance being five-sixths of the gas used in corresponding periods. Shops, places of entertainment, hotels, restaurants, clubs, &c., all had time regulations applied to them with a view to produce curtailment of the use of light and heat. Minimum consumptions of gas of 3000 c.ft. in the quarters from March to September, and 3500 c.ft. in the winter quarters, were not interfered with, neither were the minima of 20 and 40 units respectively for electricity. Proceedings were to be taken under the Defence of the Realm Act for non-compliance, unless some reasonable explanation could be given; and consumers were faced with £100 fine or six months' imprisonment for infringements which could not be vindicated. Naturally, this produced difficulties for gas undertakings. They need not be detailed; but it was clear that consumers who had previously practised economy would be very hard hit. The Coal Controller recognized that the plan was a crude one; but the position was its justification as an emergency measure. The results of the scheme were varied. At the end of the June quarter, certain undertakings found that consumers had materially reduced their consumption, while in other cases there had not been any reduction. Mr. Charles Hunt stated that the ordinary consumers of the South Suburban Gas Company had in the three months reduced their consumption by 14·1 p.ct. Simultaneously, it was learned by the Coal Controller's Department that, where there had been large reductions of gas consumption, there had also been a considerable return to the burning of coal, which was just what the Coal Controller did not desire.

It was soon clear that—proving the failure of the first scheme—if Sir Guy was bound to gain economy through domestic use, he would have to devise something that would comprehend all classes of fuel. Before this, information had been received as to what was being done on the Continent; and there it was found that the charging of prices which penalized the consumers heavily for excess consumption had not had the desired effect. Therefore, the Coal Controller's Department set about producing a fresh rationing scheme before they knew exactly the effect of the first one. The interests concerned—the National Gas Council for the gas industry—were invited to assist the Coal Controller in his plans; and no effort was spared on behalf of gas undertakings. When the proposal for the new gas ration leaked out, there soon appeared in our columns several articles which put the national claims for gas products plainly before the Controller—notably the articles signed "Cricket." A point which was particularly made was that the new ration should be based on the principle that as much coal as possible should be diverted from the domestic grate to gas-works retorts, as being, in the interests of the country, the more economical use of coal. It was also suggested that the Admiralty, the Army Council, and the Ministry of Munitions should be brought into consultation. Of course, gas-works have their limits, and so have the gas appliances fixed in dwelling-houses. The four years' war had drawn-in these limits tightly.

Though generally the terms of the new scheme became known before then, the new Fuel and Lighting Order was not published in the "London Gazette" before July 2, after the period had commenced for the application of the rationing; and September was well here before the extraordinarily complicated machinery and forms were ready to give effect to the Order. The new scheme applied only to domestic service; but an extension to industry was foreshadowed. The scheme was based on coal tonnage, and two scales were allowed—"A" for Northern Counties; "B" for Southern ones. On account of the colder conditions, the "A" scale was slightly superior to the "B." Respectively, they commenced with 3½ tons and 3 tons where the rooms occupied were not more than two, and ran up to 12 tons and 11 tons for twelve rooms. For every additional room 1 ton was allowed until a maximum of 20 tons was reached. Thereafter, additional allowances were in the discretion of the Local Fuel Overseer. The Order was quite voluminous in character; and its detail almost overpowering. No one who did not exclusively live with it, and had no other concern to occupy him, was able to bear in mind all for which provision was made. In certain places (hotels, clubs, and boarding-houses), there was provision for special assessments; under certain domestic and working conditions, application could also be made to the Local Fuel Overseer for extra allowances. We cannot enter into all the features here. The "JOURNAL" for July 9 (p. 74) will supply the information.

But dealing with the ordinary fuel ration, householders were to be allowed to convert their coal ration into gas or electricity for heating purposes—the equivalents allowed being 15,000 c.ft. for gas, and 800 units for electricity, with the right specifically reserved to the Coal Controller to increase or reduce either equivalent as local circumstances dictated. Coal could also be converted into coke in the ratio of 3 tons of the latter to 2 tons of the former. In addition, lighting allowances were made—one to three rooms being granted 7500 c.ft. of gas or 120 units of electricity onwards to 30,000 c.ft. of gas or 480 units of electricity for nineteen to twenty-one rooms. There was widespread public protest against the gas equivalent on the ground of its inadequacy; and the protest found expression in the House of Commons and at many meetings. Representatives of the gas industry had vigorously protested against it, when the terms were under consideration, and had argued with the Coal Controller for at least 20,000 c.ft., in view of the value given through carbonization by a ton of coal in gas, coke, tar, benzol, liquid fuel, acids, sulphur, sulphate of ammonia, and numerous other derivatives. Mr. H. E. Bloor, at one of the North of England Association meetings, considered that 18,750 c.ft. should have been the minimum allowance; and many gas men agreed. But the Coal Controller was inflexible. He could not afford an allowance for the coke; he wanted it all to help him eke out his coal supplies. The President of the Board of Trade, at a meeting at the Mansion House, stated that the conditions of transport would not allow of any increase of the 15,000 c.ft. equivalent. But the controlling authorities did not appear to realize that they were encouraging consumers to use coal and not gas. Some enthusiasts went to remarkable extremes in suggesting equivalents—equivalents that no gas-works could stand under its current conditions, if all gas consumers had taken maximum advantage of the considerably higher allowances that were named, which might have been right enough in other circumstances.

On the other hand, it was difficult, if not impossible, to reconcile Sir Guy's obduracy as to the amount of the gas ration with his generosity over the electricity ration; for figures which he himself subsequently published showed that the average consumption of coal per unit generated in Durham and Northumberland was 2·48 lbs. and 2·51 lbs. respectively; while in other counties it lay between 3 lbs. and 16·92 lbs. Yet the maximum consumption per unit generated should not be above 2·8 lbs. to allow an equivalent of 800 units per ton; and the 2·8 lbs. is insufficient if we reckon (as we should do) the consumption per 800 units delivered. So the Coal Controller was largely out of pocket by his all too liberal electricity allowance per ton of coal. If the new rationing order is going to have any large effect upon the gas business (and recently published figures for London suggest that it is), it is going to produce considerable loss for gas undertakings, and an extra charge for the gas consumers, as it follows, as the Rt. Hon. Sir Daniel Ford Goodard, M.P., stated at a meeting of the Tottenham District Company, that standing charges remain the same.

In the first quarter of the application of the new Order, there was confusion in the country, owing to people not understanding what they were to do, and to the fact that the machinery for dealing with it was not in order. Sir Daniel Ford Goddard, Sir Fortescue Flannery, and others in the House appealed to have the Order abandoned or else deferred to October 1. The National Gas Council, the Manchester Institution, and other organizations also made similar representations; but it was asserted that the courses suggested were not possible in the circumstances. How far this was true, was seen by the fact that, towards the close of the quarter, the announcement came that gas and electricity rationing was to start from the reading of the meters at the end of September, while coal-rationing was to commence from the date the requisition form was sent in, provided it was prior to Oct. 31. It may be surmised that, taking the country through, the work of rationing has not yet been completed; for towards the end of the year it was stated that in Islington alone there were 12,000 persons

who had not returned their rationing form. If this is the case in one section of the Metropolis, what of the whole country? Early in November the Coal Controller further reduced the lighting allowance in hotels, restaurants, and large shops in London and big provincial centres; the scale of allowances being trimmed by 25 p.ct., subject to the consideration of special circumstances. But on Christmas Eve, the Board of Trade revoked the restrictions as to the hours and use of gas and electricity in hotels, restaurants, places of entertainment, and shops, subject to the rations allowed under the Fuel and Lighting Order. The prohibition continues as to the employment of outside lights, except for shop window lighting when there are no inside lights. All that has been done, said, and written in connection with this rationing business would, to only briefly survey it, require the whole of the space devoted to the retrospect.

With a note or two more, however, this chapter in the history of the year must close. The Scottish Fuel and Lighting Rationing Order came into force on Oct. 1. It gave, on the average, an increased allowance of 1 ton of coal on account of the colder weather northwards, as well as an increased lighting allowance. The Ministry of Munitions also took power in September, with a view to maintaining or increasing the supply of light, heat, or power for the production, repair, or transport of war material, to direct if necessary that lights should be extinguished or restricted between such hours, or in such areas, or on such premises, as they might specify, as well as prohibit, restrict, or otherwise regulate the supply or use of electricity. In order to enlighten the public on the Rationing Order, the British Commercial Gas Association spent some £3000. Divisional officers for the gas industry were also appointed to assist the Divisional Fuel Overseers. Certain coal merchants tried to make capital out of the rationing business by freely advertising the relative costs of a ton of coal and of the gas and electricity equivalents; but their little game was quite spoilt by bringing into comparison the relative efficiencies of the three classes of heating agent. Sir Guy Calthrop has pointed out that though the armistice has been signed, the coal position, at home and on the Continent, is such that control and rationing must still continue for some time, though latterly he has indicated that release will probably first be made through gas and electricity.

But there was one concession for which the country was deeply thankful, and this was that on the memorable Nov. 11—the day Germany signed the armistice on the Allies' terms—the regulations as to masked street and shop lights and lowered window blinds were all withdrawn, and welcome was again given to more cheerful conditions in the streets at night time, although the Coal Controller could not permit the use of an increased number of street-lamps. So in this respect we are not yet on a pre-war basis. But the long spell of nocturnal gloom through which the country has been passing, in order to beguile the murderers in the air, has fortunately come to an end.

Coal Economy in the Industries.

As already remarked, the Coal Controller foreshadowed a fuel rationing of industry; but it is not likely that such a scheme, with all its complexity, will be persisted in, in view of the armistice and the prospect of an early peace. When Sir Guy suggested industrial rationing, he was referring more to the non-essential industries, not to the essential and war-material producing ones. But he made a special appeal to the industries to produce, by additional care and control, all possible fuel economy. He specially cited the electricity industry, the coal consumption of which he found varied so widely that his expert advisers and lecturers could not defend certain of the worst consumptions on the grounds alone of plant inefficiency and load variations. Want of supervision, they believed, was largely responsible. But what Sir Guy did in promoting economy in industry will no doubt have lasting beneficial effect. He enrolled a number of engineers—some 400, it is understood—to inspect industrial fuel-using plants and to offer advice as to how to produce economy of fuel. There is plenty of room for it; for, as Mr. David Brownlie, B.Sc., has shown, the average net working efficiency of steam-boiler plants is only 60 p.ct.; and with a total coal consumption for steam generation of 75 to 100 million tons per annum, if scientific methods were adopted, boiler plants could be run at an efficiency of 75 p.ct., which would represent a saving of fuel of from 15 to 20 million tons.

Impurities in Coal.

The question is whether all this work was the simplest course to ease the position in connection with coal. It is clear that the Coal Controller did not, and could not, secure any material help from the large section of recalcitrant miners. But it is pretty obvious that distribution was an equally bad factor in the situation; and it is a question whether the coal situation ought not to have been primarily handled from the transport end rather than from the fuel-consuming end, with a view to an effort being made to obtain more rolling stock. In fact, the interests of the country were severely tampered with through the deficiency of rolling stock. Beyond appeals, nothing much was done (we do not say things continued to be as bad as they were) to relieve transport of the excess percentage of inert material in coal, which also distributed inefficiency in heating and productive operations throughout the country, and so wasted money. Then, again, the Coal Controller, in allowing 800 units of electricity per ton of coal, himself permitted waste of fuel at the generating stations; for the thermal inefficiency of electricity generation is notorious.

The question of impurities in coal, continued early in the year to produce great criticism and much resentment. As instances, it was stated at the annual meeting of the Gas Light and Coke Company that, in some cases, deliveries had been found to contain as much as 30 p.ct. of ash; and at the Brentford Gas Company's meeting, 25 p.ct. was mentioned. In a paper by Mr. H. O. Carr before the Southern Association, the wastefulness of the excess impurity was brought down to calculation; and Mr. G. M. Gill graphically showed on the same occasion how it affected the South Metropolitan Gas Company. Subsequently, however, in our "Correspondence" columns, we had a "Colliery Director" urging that there was a certain amount of blame attaching to gas-works authorities in that they had not in the past encouraged colliery owners to supply washed qualities of coal, but instead unscreened coal to an increasing extent. About the same time, the Coal Controller issued his appeal to the general managers of collieries and to the Secretary of the Miners' Federation, asking them to use their influence to improve the output of coal in respect of inert material. Mr. Wilson for the steam-raising side and Mr. Thomas Glover for the gas industry were requested to obtain samples of coal, and ascertain whether any improvement took place. We have had no official figures to show the result of this; but from some quarters we heard that improvements had occurred—some tests of Durham coal, for instance, disclosing that, during the first six months in the year, the averages of 25·5 p.ct. of volatile matter and 13 p.ct. of ash were found. It may be noted that the French Ministry of Munitions took in hand the question of inerts in coal, and decided to have samples of coal from the pits analyzed, and prices fixed on the basis of ash content and size.

Improving Coal to Obtain Higher Efficiencies.

The inefficiency that excess inerts produce in carbonizing operations is well known—in the furnaces, in the retorts, in output and quality of products, and in the labour demanded. The effect upon the quality of coke (in which all the ash in the coal is embodied) is little short of disastrous. The loss of efficiency, too, is not directly proportional to the increase in the quantity of inerts. This has been proved in boiler operation—the fireman being able to get much more evaporative duty in proportion from a clean coal than from a dirty one. In America the same point has received notice. The United States Bureau of Mines states that the ash content there rose from 8 to from 16 to 18 p.ct. Experiments made at St. Louis showed that, in addition to the proportionate loss by dilution, the increase in ash diminished the efficiency of the remaining good fuel to the extent of 1½ p.ct. for every addition of 1 p.ct. of inert matter. All this is supplementary to the uneconomy of the conveyance of useless material. Only 10 p.ct. excess means the conveyance per million tons of coal of 100,000 tons of additional rubbish.

This brings us to a point raised by Mr. Glover at the Southern Association meeting already referred to. He suggested, as a question for consideration by the gas industry in connection with its reconstruction policy, whether increased efficiency would not pay for the grading and washing of dusty coal. Another gas engineer, in an article in our columns, referring to the heavy percentage of dust in coal, pointed out that dust is a poor conductor of heat. Directly

the proportion exceeds 10 p.ct., there is trouble in the retort-house. The dust lies dead in the retort, and does not commence to evolve gas for a considerable time after the lid is closed. The production per retort falls; and there is per ton of coal carbonized a corresponding increase in labour, in wear and tear, and in consumption of furnace fuel. Mr. Glover, in recommending the grading and washing of coal, is out for getting the best physical condition that will produce the highest efficiency from the plant. Thermal improvement (including heat transmission) in the retort-setting would be obtained; and the volume and quality of products would ascend. When there is a lot of dust and impurities in the coal, more fuel is required, furnace work is hampered, results are degraded, and there is more clinker with which to deal. Every step made in higher efficiency means reduced capital costs per unit of production.

COAL PRICES AND MINERS' WAGES.

In connection with coal, a very serious matter to the gas industry has been the increases of price. Two additional ones came, closely following each other, as "bolts from the blue," while the charges for gas had already been fixed on the new coal contract prices. It had been known that there was some restlessness among the miners; but it was not anticipated that such rises in coal prices as have taken place would be inflicted. In part, they were not altogether dissociated from the Coal Mines Control Act, which received the Royal Assent early in the year. The Coal Controller was then given to understand by Parliament that coal control must be self-supporting. At the beginning of the year, gas prices had to go up to meet the 2s. 6d. per ton increase inflicted the previous autumn on account of the then rise in miners' wages. Then the Coal Controller himself hinted that the profits of the coal industry would have to meet the financial obligations of the scheme embodied in the Control Act; and later on it was heard that he had instituted an investigation into the costs, selling prices, and profits of coal in comparison with the pre-war period. From June 24, without any further word of warning, the prices of coal were increased by 2s. 6d. per ton in respect of enhanced costs. This had nothing to do with an application by the miners in May for an increase of 1s. 6d. per day for men and 9d. for boys. There was negotiation, and threatened trouble, over this. In the end, the application was conceded; so that the price of coal at the pithead is now 10s. 6d. per ton above the pre-war prices, and 13s. in South Wales, Monmouthshire, and the Forest of Dean. On the gas industry's consumption of approximately 20 million tons of coal a year, 10s. 6d. means £10,500,000, without reckoning the 2s. 6d. addition for South Wales, Monmouthshire, and the Forest of Dean; or, taking the last 4s. only, this means an additional £4,000,000. As to whether these extra prices are justified, many collieries have been making considerable profits—much higher than before the war. The "Iron and Coal Trades Review" [see "JOURNAL" for July 9, p. 58] suggested that the collieries had been taking liberties in fixing the average selling prices of coal, which were "considerably higher than in the strict sense the Act allowed had it been followed to the letter." On top of this fictitious basic selling price, comes the 10s. 6d. or the 13s. per ton, as the case may be. The New Moss Colliery Company and H. S. Higginbottom & Co. were mulct in heavy fines for exceeding the statutory limit; but possibly they were unfortunate offenders—unfortunate in being found out—among many who have disregarded the Act. It has been suggested that, in view of the scramble there will be for stocks for some time to come both for home and abroad, the limitation of prices should be continued for a longer period than the six months provided for from the termination of the war. A distinctly uncomfortable feature is that, through no fault of buyers, arrears of contract deliveries have, under the fiat of the Coal Controller, to be paid for with the additional prices attached. In connection with coke contracts, too, the National Gas Council early in the year drew the attention of Sir Guy Calthrop to the unfairness of the increased coal price. His reply was that he had no power to make a surcharge; and all that could be done was in future contracts to insert a protective clause, in view of possible further increases in coal prices.

FUTURE CONDITIONS AND WAGES FOR MINERS.

It will be a long time—perhaps never—before coal prices will recede to pre-war figures. The miners appear to be pretty solidly resolved not to concede their war gains; and they are seeking new conditions. The reconstitution of the Conciliation Board for England and North Wales is being sought; and a special meeting of the coal owners' and miners' representatives has been held, at which a Committee was appointed to draw up the terms upon which reconstitution should take place. The men want to bring in all workers who are members of the Miners' Federation; and among other conditions are these: That six shifts be paid for five worked to all workmen employed on the afternoon or night shifts, subject to the proviso that wages equal to the wages payable for a shift and a fifth shall be paid in respect of each shift worked. That the existing war bonus of 18 p.ct., calculated upon current rates, be merged into present wages and be the basis of a future agreement. That there shall be no maximum in any future agreement. That, in any agreement regulating wages within the federated area, the basis upon which advances are secured shall be the current rates in operation at the commencement of the agreement. That as the selling price of coal is an important factor in the regulation of wages in the Board's area, such selling price be fixed by the Joint Board.

COAL CONSERVATION AND GAS AND ELECTRICITY SUPPLY.

There has been a large amount of coal conservation talk during the year. Admittedly, there is room for coal conservation, as the crudeness of coal use in industrial and domestic service is wasteful in the extreme, except in the former the coal be of a class only useful for steam-raising, and in the latter case coal is used which would not be valuable for carbonization purposes. The gas industry has been proved to be the one that puts coal from the national point of view to most profitable use. And yet the industry is the one which has had least attention bestowed upon it by the powers that be; and throughout the war, though its products have been so vastly wanted for munition and other national purposes, it has been fettered and controlled to such a degree that it has been wondering whether it has a soul it can call its own or capital that deserves to be rewarded. The electricity supply industry has had three special inquiries made into its position; but the two reports that concern us here are those of the Electricity Sub-Committee of the Coal Conservation Committee of the Ministry of Reconstruction, and of the Committee which was subsequently appointed by the Board of Trade.

The former body proposed coal-carbonization, superstations for the generation of electricity, and districting for the purpose of carrying out immense schemes. Of the coal now expended in power and traction in this country, it is estimated upon paper that 55 million tons would be saved, and that there would be a final saving of 100 million tons. These schemes—based on a most vague foundation and optimistic calculations—have appealed to politicians and daily newspaper editors, but are laughed at by electrical experts. The Board of Trade Committee did not go this length; but they proposed a scheme for the appointment of a Board of Electricity Commissioners to take over legislative work, with the District Boards to deal with generating and distribution schemes so as to bring about unification. The proposals have given rise to a sharp division in the electricity supply industry; the municipalities more especially being unwilling to forego any of their present rights and privileges.

Harking back to the Electricity Sub-Committee's report, through the intervention of the Fuel Research Board, it has been decided that coal carbonization shall not form part of the scheme until the Board have reported. In connection with coal carbonization, a Sub-Committee was also appointed by the Ministry of Reconstruction; but its report was a most featureless document—the opportunity being again missed for saying something as to the potentiality of the gas industry. The work of the Fuel Research Board was made the haven of refuge for this Committee not exerting themselves. The Institution of Gas Engineers are now having a report prepared on the question of coal conservation. When this is available, the authorities will see that there is something of considerable importance to be said for the gas industry—at once, and without waiting for the Fuel Research Board's report. Gas should take a considerable part in the great reconstruction work of the country, through the provision, as far as the new circumstances will allow, of cheaper and more useful gas.

FUEL RESEARCH BOARD.

Little news has been forthcoming as to the progress that is being made by the Fuel Research Board. But the third annual report of the Privy Council for Scientific and Industrial Research informed us that upon the first part of the plant at the East Greenwich research station some £120,000 is being spent; and it is hoped that research work will be commenced with it in the new year. Prof. Bone has resigned his position as Consultant to the Board, in order to devote himself to the plans for post-war development of the Department of Chemical Technology at the Imperial College of Technical Science. Prof. Gray is acting as organizer on the chemical side of the fuel research station.

STEAMING AND BLUE WATER GAS.

While coal conservation has been talked about, the gas industry has been working at it in a practical way. The oil situation got worse instead of better (though it has improved since the armistice); and the allowances for carburetting water gas were during the year on a very low scale. The use of blue water gas has been extensive; and those gas-works that have had recourse to it have, while helping themselves, been assisting the Coal Controller, and, as Mr. Glover said at the Southern meeting, have helped to improve their stocks. But, perhaps, the greater technical interest has been in the direction of steaming; for in this developed process, practised on a scientific scale by having regard to temperatures, steam pressures, and consumption, and, where the maximum results are required, to the freedom of the coal from undue quantities of dust—in fact, a nutty coal is best, so as to allow more porosity through the charge—experiences have been accumulating which show that considerable additions to the gas produced per ton of coal are obtained with little decline in calorific value, as well as enhanced yields of liquid fuel and ammonia, with, comparatively speaking, modest effect on the coke yield for sale and used for fuel. Of course, one does not get something for nothing; but the "something" is found remarkably cheap and profitable at the price paid. We have again this year published much evidence on all these matters from the pioneers working in many places—the Glover-West retorts—in this particular direction of continuous steaming on the large scale. Excellent results have also been published through Mr. Tim Duxbury's working at Oldham with the Dempster-Toogood retorts. It has been mentioned, too, that experimental work has been proceeding with the Woodall-Duckham system. Intermittent vertical retorts have been taken in hand by Mr. Thomas Settle; and Settle's "Downward" steaming process is the result. Inclined retort charges are now being steamed; and work is going forward rapidly with horizontal retorts. Rew's system is one, and other engineers—at Marple and Littlehampton, for instance—are operating in the same direction. There has likewise been some confirmatory work in America, where great interest is being taken in the steaming process. It is quite impossible to compare results between one system and another, and between one town and another; but it can be said that vertical retorts through the facility with which they admit the application of the process take the lead under any given conditions. The reason that comparison is difficult is because the physical condition of the coal has so much to do with the length to which steaming can be carried. This accounts largely for the differences in results. But when we find at Macclesfield an average make of about 16,000 c.ft. of 476 B.Th.U. gas per ton, and actually sold close upon 15,000 c.ft., there is gratification over a technical advance which gives to the industry a considerable commercial benefit. In other cases, higher figures are recorded. We have Mr. Tim Duxbury speaking of 17,028 c.ft. of 465 B.Th.U. gas; and he has run his plant experimentally up to 23,521 c.ft. of 460 B.Th.U. gas, with an enlarged production of tar and ammoniacal liquor. Generally speaking, nearly all gas engineers who are operating on these lines show a higher make of ammonia comparing their prior working with the same coal. The testimony of Mr. Lawrence Hislop as to experience at the Uddingston Gas-Works is of a remarkable order; and it is interesting to learn, from Prof. Cobb, that these works have been placed at the disposal of the Gas Investigation Committee, so that we may expect a large amount of interest from the research that will take place there.

An instructive article by a gas engineer who had investigated the Settle "downward" steaming system for intermittent verticals at Truro appeared in our columns. The working there was conducted with the view of producing 500 B.Th.U. gas. Working to this figure approximately 20,000 c.ft. was obtained, which means (say) 10,000,000 B.Th.U. per ton of coal, or (roughly) about one-third of the calorific value of the coal. It is clear that, taking the thermal value of the coke and tar, and the additional calorific value produced in gaseous form, the thermal efficiency of the carbonizing process is through steaming being raised very substantially.

The theoretical considerations applying to the steaming process supplied part of the subject-matter for the William Young Memorial Lecture which Prof. Cobb delivered to the North British Association of Gas Managers. This lecture put the theory in such an understandable form that the practical results are easily appreciated; and it will stand as a classical contribution to the subject. The importance upon carbonizing results of producing a suitable change in the gaseous atmosphere in the retorts is demonstrated by the process. The admission of steam for conversion to water gas and its pressure helps to drive off and to protect the hydrocarbons before they can become degraded or destroyed; and the hydrogen through its diffusive power penetrating into the charge picks up a large part of the volatile matter which would remain in the interstices of the coke, and carries it off. In this way we see why the make of gas can be so greatly enlarged without the gas depreciating much in quality. Laboratory experiments have also shown Prof. Cobb that while nitrogen is no friend of benzene, hydrogen is—nitrogen favours its decomposition; hydrogen limits it up to a certain temperature point below ordinary retort carbonizing temperatures. Steaming also tends to a higher yield of ammonia. But at the moment—perhaps his coming investigations will alter his opinion—he inclines to the admission of blue water gas to the retorts rather than steam. Unless the temperature in the retort is high, the water-gas reaction occurring there is liable to produce an inconvenient amount of carbon dioxide. Mr. J. Dickson called attention to the discouraging results that have been met with by oversteaming—one result being the filling of the works' liquor wells with distilled water. Excessive steaming also puts back the heating of the settings. The essential thing is to get the correct quantity of steam through the incandescent body of fuel. A point favourable to steaming in continuous vertical retorts, and bearing upon the question of inerts in gas, was made by Mr. Alexander Yuill. He was referring to the suggestion that 12½ p.ct. of inerts in gas should be the maximum. The 12½ p.ct. might be the minimum that could be reached with horizontal retorts; but, as he pointed out, with vertical retorts and superheated steam this figure might be reduced by 50 p.ct.—inasmuch as in the decomposition of steam, the hydrogen, while in the nascent state, combines with the nitrogen to form ammonia, and the oxygen with the carbon to form carbon monoxide. A point remaining to be conclusively settled is as to whether there is any real advantage to be obtained by the use of superheated steam. Some think one way; some the other. In a report by Dr. Colman and Mr. Winmill it was stated that, at any rate in one system of retorts, providing the steam is dry, no advantage is found in superheating it.

OIL, LIQUID FUELS, AND LOW-TEMPERATURE CARBONIZATION.

These are inseparable subjects. They have combined to make during the year an interesting and highly polemical position. Every system of producing oil in this country has been fighting for its own hand; and the low-temperature advocates—the Coalite people (past-masters in advertising) in particular—have been displaying great vehemency over the matter, apparently wanting to get in while men were in governmental power who were favourably disposed to new enterprise. But the Government had learned much about low-temperature carbonization. They had even gone so far as to indulge in a little speculation in the Barnsley smokeless fuel adventure; but they afterwards discovered that the system would not serve their purpose. Then came the demand for liquid fuel. The low-temperature people shifted their former ground. There was nothing like low-temperature carbonization for securing the highest yield of liquid fuel per ton of coal. They had not counted on the

results from existing continuous vertical retorts worked at graduated temperatures, with steaming; nor had they taken into account the question of over-all economy. The liquid fuel position became one which required immediate consideration through the activity of the submarines, together with the heavy demands of the Navy. The Government were attacked in the House and in the Press in regard to their oil policy; the attacks being almost invariably traceable to low-temperature sources. A series of articles appeared in the "Financier" (Coalite inspired), containing much that was extravagant in claim, and letters of a critical nature found their way into the "Times" and other papers. More to the point were the papers before the Institution of Petroleum Technologists which dealt chiefly with the carbonization of inferior materials by the low-temperature process. It would take too much space here to review all the flood of material, interesting though it was. But, having regard to the particular purpose of the Government, there were two things that were always evaded by the writers—the questions of time and economy. As to time, events showed that no good purpose would have been served by entering into large expenditures of money, materials, and labour; for the outlay would still have been proceeding with no liquid fuel result, but with an armistice here which prevents the renewal of hostilities, and supplies of liquid fuel more abundant and prices lower.

There was yet another point. The Mineral Oil Production Department rightly came to the conclusion that it was their duty to give consideration not only to finance, materials, and men, but to the economy to be derived from the whole of the products of carbonization. They found, so regarding the matter, that the fullest measure of economy could be obtained from the existing continuous vertical retorts; and this was demonstrated to them by Mr. John West and those associated with him, and confirmed by gas-works possessing continuous verticals—especially by the Radford Gas-Works of the Nottingham Corporation, which were handed over to the Government for their use. It was arranged, much to the chagrin of the low-temperature people, to make use of the vertical plant at gas-works and coke-oven plants to the largest extent; and at the same time the Government erected a battery of low-temperature retorts for enabling comparisons with the results derived from the continuous verticals. They had had prior experimental work, and were able to make comparison of the two systems, to the discomfiture of those who were desirous that the Government should commit themselves and provide materials and labour for the construction of large low-temperature plants. Dr. Addison, in the House, was able to show that the capital cost for low-temperature plants to deal with 100 tons of cannel was four times that stated by the advocates; and that their figure of 40 gallons of oil per ton was only derivable from specially selected cannel—the average production being more like 25 gallons. Dr. Mollwo Perkin stated that 20 gallons would, taking the average of different materials, be a fair figure. The results from the continuous vertical retorts, worked with graduated temperatures and steaming (the low temperatures at the top producing the oil vapours, and the steaming sweeping them out), were with similar coals not far different in volume from the results obtained with low-temperature retorts; and the users of the verticals had all their established business connections for dealing with the gas and other bye-products. Mr. F. D. Marshall was sceptical; but the results were being produced in day-by-day working. The Government arranged for the available cannels and suitable coals for liquid fuel production to be used in continuous verticals; and here came in another point. The continuous verticals were capable of treating all the cannel that could be produced, in view of the position of labour, machinery, &c. A fortnight ago Dr. Perkin criticized the results from the continuous verticals so far engaged in liquid fuel production; but we were able to show that his figures were erroneous. Besides the criticism was unfair, seeing that the retorts were little more than starting on the work.

At a conference at Manchester on the subject, at which Sir Arthur Churchman was present, the owners of continuous vertical retorts promised to help the Government to the fullest possible extent. Later the case was well put by Dr. Colman and Mr. Winmill in a report which showed the importance of oil production and commercial expediency going hand in hand. This report disclosed excellent oil results with continuous verticals, with gas production per ton maintained, and sulphate of ammonia higher than with low-temperature systems. Reports were also issued by the Petroleum Research Department and a strong Committee appointed by the Institution of Petroleum Technologists. These were favourable to low-temperature carbonization; but a report by a Committee appointed by the Ministry of Munitions, and presided over by Lord Crewe, emphatically stated that sufficient consideration had not been given to the practicability of the proposals in view of the position in regard to labour, materials, and time.

Another plan to secure additional supplies was the offer of a prize of £2000 by the Government, through the Mineral Oil Production Department, for a new fuel oil which would answer the broad requirements of the Admiralty specification. The idea was the production of a fuel oil by the admixture of dehydrated coal tar with petroleum oils. It was suggested that no less than 95 p.ct. of the original dehydrated tar should be used, and that the admixture should contain no less than 33 p.ct. of dehydrated tar. It was required that the mixture should be one that could be put indiscriminately with oils brought from other sources, and one from which there could be indiscriminate withdrawal. What happened in this connection has never been divulged; and there has been no announcement as to the prize having been successfully captured by anyone.

During the year, too, the Government has evinced considerable anxiety to enter upon a scheme of prospecting to ascertain whether the country possesses any subterranean stores of oil. Considerable difficulty has been experienced in this connection—mainly in respect of the question of royalties; and it looked at one time as though the whole scheme would fall through. The Government are minded that, if there is oil to be obtained from underground sources, it shall be developed in the national interests, and not be exploited for the benefit of company promoters. An Act was passed to preserve all rights to the Government, and prevent indiscriminate boring, which has been productive of so much waste in other oil-yielding countries. The firm of which Lord Cowdray is the head offered their resources and experience to the Government; and, just before the end of the war, a commencement was made with the first trial boring on the Duke of Devonshire's property at Handstoft. With all this, after the war the statistics as to the imports of liquid fuel were available for the eleven months ending November; and it was found that no less than 765 million gallons had been imported, compared with 373 millions in 1917, and 20 millions in 1916. The price of liquid fuel was put down £4 per ton towards the end of the year.

It might be mentioned here that during the year the supplies of gas oil were very poor—in fact, under an order of the Ministry of Munitions, without special sanction, the use of oil was prohibited for gas making, other than to enable mixed coal and water gas to be maintained at a calorific value of 450 B.Th.U. gross. Anyway, the control price was at a figure that prohibited general employment for gas making even if it could be obtained. Just recently, however, it has been announced that, in the eleven months ending November, 35½ million gallons of gas oil were imported, compared with 29 millions in 1917, and 53 millions in 1916. About the same time, the Government made a reduction of 7½d. per gallon in the price of gas oil. Paraffin was also brought under control; and its use was prohibited for cooking and heating in any house in which provision had been made for the use of gas or electricity.

Reverting to the Coalite Company's affairs, the conclusion was announced of negotiations between the British Coalite Company and Low-Temperature Carbonization, Ltd., for the exploitation of the patents throughout the United Kingdom—in other words, they were appointed Managers of the Coalite Company; and later on they took under their wing the management of the Barnsley Fuel Company. This does not seem to be the end of the shuffling of the Coalite cards. Nothing has as yet been heard of the successful operation of the Barnsley Fuel Company's plant—in fact, the other day it was reported that it was being used experimentally, with the view to further improvement. At the beginning of the year, it was stated that the plant had been running some six months, but at times only partially, owing to difficulties and breakdowns. Nevertheless, it was claimed that the value and practicability of the process had been demonstrated. Later on, it was heard that further information as to this plant could only be obtained at the office. There has been a great deal of secrecy as to the operation of the plant. But the veil was lifted a little in a paper read by Mr. Edgar C. Evans before

the Society of Chemical Industry, which confirmed the view that the Coalite process was not yet "out of the wood" in regard to engineering difficulties. Fire-clay retorts are now being used, with graduated temperatures; and it appears that an auxiliary arrangement has been adopted in connection with the heating of the retorts for the purpose of exposing the paraffinoid tars to a higher temperature, in order to convert them to aromatic hydrocarbons. This seems to be a circuitous method to adopt, when the aromatic hydrocarbons could be obtained by the application of higher temperatures at the outset, together with considerable yields of gas of a character suitable for general use. Low-temperature carbonization has not yet proved its commercial efficiency. Meanwhile, the Nitrogen Products and Carbide Company have adopted high-temperature carbonization—their choice having fallen on the Glover-West system; and it was for the purposes of this Company that a large amount of investigation work was done (as was detailed from time to time by Mr. John West) which has supplied to the gas industry enlightenment that marks substantial progress.

WHAT IS TO BE THE FUTURE QUALITY OF GAS?

The question is difficult to answer. But there is this assurance that, after war-time experiences with steaming and blue water gas, there can be no retracing steps to the gas that ruled before the war. The standards that then obtained, the authorities have to be shown, are not those that will allow of the most economical use of the coal carbonized for producing gas for town supply. We are confident, as Sir Dugald Clerk intimated at the last meeting of the Institution of Gas Engineers, that the correct thing is to put into the town mains in gaseous form a higher number of B.Th.U. per ton of coal. This is the direction that much work has taken during recent times when need acted as an efficient spur; and it has been, as already seen, highly educative as to economy. But there is one thing that must be borne in mind; and it is that, at the present stage, the gas must be of a character that can be consumed efficiently in the millions of gas appliances in use which are not yet fitted with the adjustments necessary for a gas far removed from present composition and specific gravity. But experience has grown which declares that, between the old standards and the gas that can be efficiently used in appliances as at present fitted, there is a considerable span within which the industry can at once work for economy. Consumers can afford to sacrifice a little in time in order to secure economy in cost, because there is no question about it that preserving the pre-war conditions would mean that the consumers would, under the new economic conditions of the industry—cost of materials of all kinds and of labour—have to pay a higher rate for gas than formerly. The best set-off to this is to be found in the higher production of gas per ton of coal; and this is a point of which some gas men do not approve whose works conditions are not favourable at present to an alteration of method.

One of the references to the Board of Fuel Research is the question of the composition of gas for town supply. The Board will not be able to ignore the practical working experiences that there have been of late within the industry in making and supplying more gas per ton of coal. The experiences of consumers, too, cannot be overlocked; and this experience is something a fuel research station in London cannot obtain, other than partially by laboratory experiment. Nor can the Board ignore the report which will soon be in the hands of the Government dealing with the relation of the gas industry to the conservation of coal. Sir George Beilby, the Director of the Board, has already found considerable interest in the work of the Gas Investigation Committee of the Institution of Gas Engineers and the Leeds University, upon which a preliminary report was made, at the autumn meeting of the Institution, by Prof. Arthur Smithells, Prof. J. W. Cobb, and the Research Chemist (Mr. James W. Wood, M.Sc). This report dealt with results from gases plain and mixed. It had one blemish, that the appliances used in the experiments—the upright incandescent burner and the gas-fire particularly—were not up-to-date representatives of real efficiency in gas lighting and heating. With ring boiling burners very close efficiencies were shown with different qualities of gas and gas mixtures, varying calorific power, and inert content. It was proved that these things did not appreciably affect efficiencies for boiling, but only time. The efficiencies ranged between 53·5 and 56·2 p.ct., which Sir Dugald Clerk says could be greatly increased—say, up to 70 or 75 p.ct.—if the manufacturers would only take the problem in hand. The report gives information as to the conditions necessary to secure good results with ring-burners. Better results than the report shows were realized with upright burners will be obtained when the investigators use, for the lower grade mixed gases, the inverted burner with its smaller mantle, which will be more suitable for the contracted flame given by mixed gases. The inverted mantle will better fit the outer high-temperature part of the flame. So far as the gas-fire experiments progressed, they point to the conclusion that a difference in the grade or composition of the gas supplied, within wide limits, does not cause any considerable difference in the radiant efficiency of a gas-fire, provided the mechanical construction of the fire will allow sufficient gas to be passed, in order that the right number of B.Th.U. per hour can be supplied to the radiants. Now a point as to inerts. Carbon dioxide is not good for gas-engine work; and Sir Dugald Clerk put the matter nicely when he said that he did not want to buy inerts in gas when he could get all he wanted free from the atmosphere. The report of the Committee also shows that there is no advantage in mixing-gas and air before distribution, seeing that burner and flame can take up all the air that they require. In an article in our columns recently, a "Gas Engineer" stated that coal gas, if correctly made, should not contain more than a modest percentage of diluent gases—nitrogen, carbonic acid, and oxygen—the sum of which should not exceed 12 p.ct. Excess of inerts denotes that something is wrong with the plant or the mode of working.

Sir Dugald Clerk has his eye on a gas of about 420 B.Th.U. as suitable for future supply; other men suggest 450 B.Th.U. as giving a sufficient range for present purposes; Mr. George Helps, in his advocacy of "Pleno" gas, says 350 B.Th.U., which, he holds, would give the gas engineer power to put 70 to 80 p.ct. of the B.Th.U. of the coal into their pipes. But, speaking generally, engineers do not appear prepared to go so far at one jump. There is an almost universal acceptance of the position that economy demands liberty to drop the calorific power per cubic foot to about the figures mentioned in the first lines of this paragraph. Mr. Charles Carpenter, D.Sc., however, in a letter to the Public Press recently urged a re-establishment of the pre-war standard of calorific power; and the Gas Investigation Committee, before they have experimented with a modern burner, suggest 525 B.Th.U. as an acceptable standard gas for lighting. This was a pity, and an indiscretion. They might have waited until they could have come to a decision with the inverted burner results before them, and after making full research into the question of gas manufacturing economy. The tests with the mixed gas were carried out at the Nechells experimental works of the Birmingham Corporation by permission of the Gas Committee, of which Sir Hallewell Rogers is the Chairman. In the same work Mr. E. W. Smith, D.Sc., the Chief Chemist to the Department, has rendered valuable help. Talking of Birmingham, in his Presidential Address to the Midland Association, Mr. W. Chaney referred to the future requirements for gas. The uses to-day, he remarked, demand a gas of good combustible qualities, capable of yielding high temperature, and rendering the best service to the consumers at the lowest cost. During the year, owing to the coal trouble, gas of very low calorific value has been supplied abroad—in Italy it has been as low as 225 B.Th.U., and in Holland 420 B.Th.U.

Incidentally it may be mentioned here that, up to the present, although the Ministry of Munitions have relinquished their power of control over benzol extraction, there has been no withdrawal of the Order which permits of coal gas of 500 B.Th.U. before washing to be supplied, and 450 B.Th.U. after washing where mixed gas is distributed. The Coal Controller still wants coal economy, and the country requires benzol for motor work and other uses, as well as liquid fuels. The National Gas Council anticipate that there will be no withdrawal of the Order until there is some settlement of the question of gas quality. At any rate, though the Public Control Committee of the London County Council appear desirous of having a return to pre-war standards, the Board of Trade suggest continuing the 450 B.Th.U. standard until the end of June. Undertakings continue to make application to the Board of Trade and the Local Government Board for Orders under the Standard of Calorific Power Act. American views are greatly relaxing as to the height necessary for calorific power. The Massachusetts Board of Gas and Electric

COMPTOIR COMMERCIAL
de PRODUITS CHIMIQUES
97, Rue Saint-Lazare, PARIS IXe
Telegrams - - "Comchimic, Paris."
IMPORTERS OF
HEAVY
TAR PRODUCTS
Correspondence solicited.

Victor Blagden & Co.
4, LLOYD'S AVENUE,
LONDON, E.C. 3.
Buyers of all
TAR PRODUCTS

AMMONIA PRODUCTS
SULPHATE
MURIATE
NITRATE
CARBONATE

PITCH
BENZOL
CREOSOTE
TOLUOLE
CARBOLIC ACID
SOLVENT NAPHTHA
PYRIDINE
NAPHTHALENES
CRESYLIC ACID
ETC.

CYANOGEN PRODUCTS
PRUSSIATE POTASH
PRUSSIATE SODA
PRUSSIATE CALCIUM
CYANIDE OF POTASSIUM
CYANIDE OF SODA

Telegraphic Address: "BLAGDENITE FEN, LONDON."

AMMONIA AND TAR PRODUCTS.
CHAS. PAGE & Co.
MERCHANTS. 47/51, KING WILLIAM ST., LONDON, E.C. EXPORTERS.
Suppliers of Benzol Washing Oil.

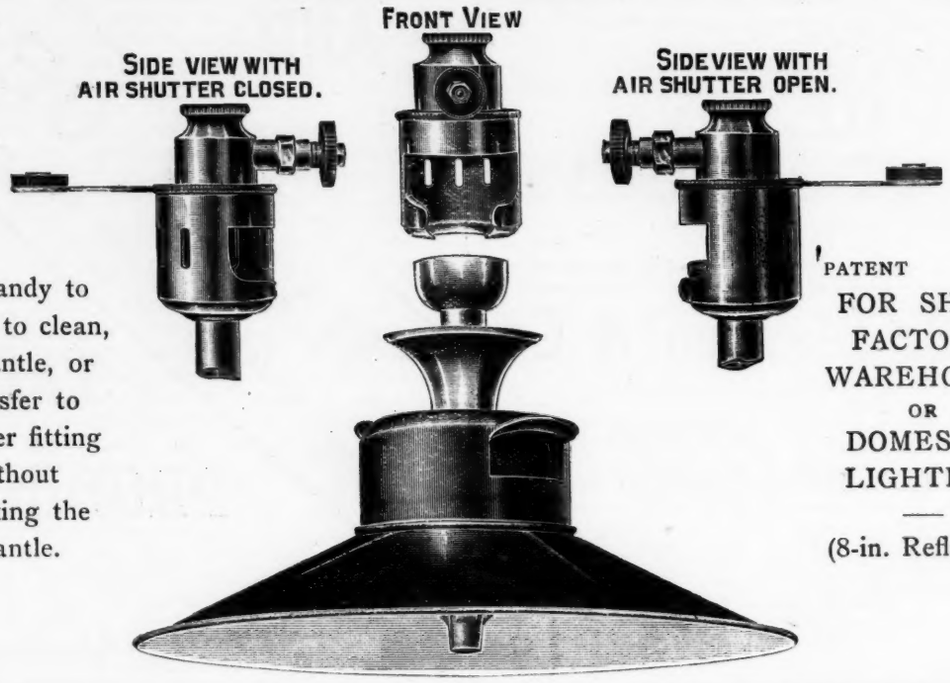
'Phone:
1890 Holborn.

ENAMELLED CROWN PLATES AND LININGS FOR
GAS COOKERS
WE UNDERTAKE TO MAKE ANY PATTERN. SEND TEMPLATES FOR QUOTATIONS. GOOD DELIVERIES.
Enamelled Printed Matter—Wall Plates for Hospitals, Tanks, Pots, Lamp Shades, and Reflectors.
A. G. CLOAKE, 54, HOLBORN VIADUCT, LONDON, E.C. 1.

WATER GAS PLANT.
ECONOMICAL GAS APPARATUS CONSTRUCTION COMPANY, LIMITED,
36, Victoria Street, London, S.W.

NEVILLE'S 'LIFT-OFF' BURNERS

(SWING PATTERN).



So handy to lift off to clean, re-mantle, or transfer to another fitting without breaking the mantle.

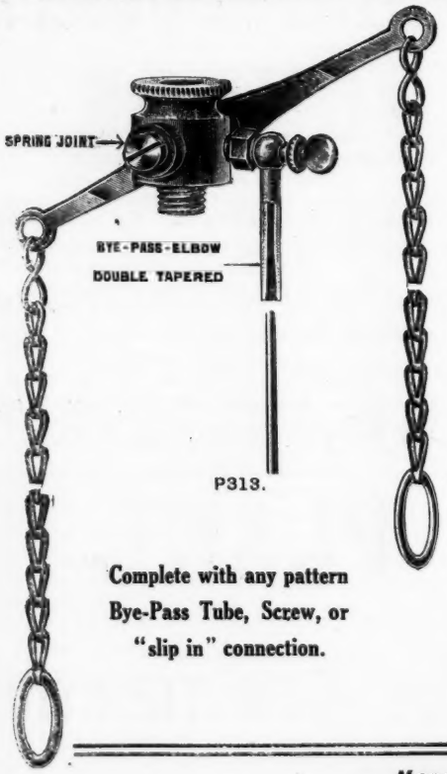
PATENT

FOR SHOP, FACTORY, WAREHOUSE OR DOMESTIC LIGHTING.

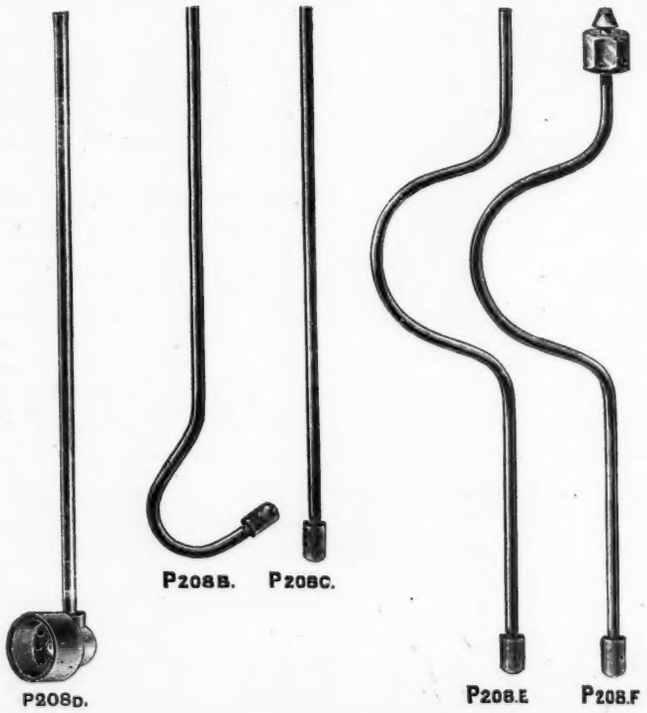
(8-in. Reflector.)

BYE-PASS COCKS AND TUBES.

(IMMEDIATE DELIVERIES FROM STOCK.)



Complete with any pattern Bye-Pass Tube, Screw, or "slip in" connection.



Manufacturers and Patentees:

PNEUMATIC GAS LIGHTING COMPANY, LIMITED,

36, FARRINGDON STREET, LONDON, E.C. 4.

Telegraphic Address: Omnibusses, Cent. London. Telephone: 2125 Holborn.

Light Commissioners have come down to 528 B.Th.U. gross. Testimony from that State is that, though the gas there has an average calorific power some 40 B.Th.U. less than formerly, the examination of the consumers' meters of a large number of companies does not disclose any increase whatever in consumption.

There have been further references to the complete gasification of coal; but no particular progress has been made in actual application. Two of the promoters of Bills in the past session—the South Suburban and South Shields Companies—applied for powers to supply non-illuminating gas, which could be used for power or any purpose, including incandescent burners, but be free from all enactments as to ordinary town gas standards. The power to purchase gas from producers outside the industry is also being now acquired session after session; the position of Middlesbrough in respect of price, with its coke-oven gas supply, being an object-lesson that cannot be ignored.

The Problem of Unaccounted-for Gas and Meter Deterioration.

War time, in different places, has witnessed a considerable increase in unaccounted-for gas and meter troubles. And from an investigation which has been made by the Gas Light and Coke Company, there can be no doubt that the two things are due to the same cause. The history of this investigation commenced in our columns with an article by Mr. Stephen Lacey, B.Sc. (Eng.), the Chief Distributing Engineer of the Company, and was concluded in two papers presented to the Institution, at the autumn meeting, through the Gas-Meters Research Committee, by Mr. J. G. Taplay, the Chief Chemist of the Company, and Mr. B. R. Parkinson. Mr. Lacey showed that, under the circumstances of the Gas Light and Coke Company, the temperature conditions of the measurement of the gas made and sold are responsible for an average loss in the neighbourhood of 1 p.ct.; the part due to leakages from holders, mains, and services does not exceed 1 p.ct.; and therefore the registration by consumers' meters must be responsible for a considerable part. The 1 p.ct. leakage would not, of course, apply to other conditions, as Mr. F. Shewring proved in a paper he read before the Welsh Institution. Mr. Taplay and Mr. Parkinson in their papers dealt with the question as affecting consumers' meters—the conclusion being that the increased part that the meter takes in raising the amount of unaccounted-for gas is probably due to three causes—reduction of the use of carburetted water gas, the removal of benzol and other hydrocarbons from the gas, and the destructive tendency of moist sulphur dioxide which is always present in blue water gas. In the part of the Company's district where oil mist is used, the meters are found to be well oiled and preserved. Mr. Taplay's paper recounted the results of his investigation made to determine the bodies condensed in dry gas-meters, and next the identification of the bodies causing corrosion of the metal parts of meters, the destruction of the leathers, and the sticking of valves. As to the sulphur dioxide, the use of a little oil for carburetting purposes or the passing of a small amount of ammonia with the blue gas into the purifiers, will eliminate it. The production of the corrosive bodies is due to the reaction of carbon bisulphide with ammonia. The interaction of these two bodies has been more energetic since the removal of benzol from gas for war purposes, and more corrosion has been produced in dry meters. Therefore, it would seem that the proper thing is to keep meters wet with some kind of liquid hydrocarbon to take the place of benzol and other bodies in small amount removed from the gas. All meters, both new and repaired, should be sprayed with a paraffin distillate; and solar distillate has been chosen by Mr. Taplay for the purpose. This brings us to Mr. Parkinson's paper, which dealt with many matters carrying instruction in regard to the problem. Towards the close, Mr. Parkinson described the process that has been adopted for spraying gas-meters with an oil fog; and, in a supplementary article by him in our columns, further information is imparted. The effect of the spraying is to clean the valves, and soften the leathers, and generally to restore the meters to normal working.

As to Trading Experiences.

No good purpose would be served, owing to the chaotic conditions, in attempting to make a general sketch of the commercial position in the gas industry at home or in any other country. Broadly speaking, of all war years, this has been the worst; every burden—increased costs, coal and oil shortage, materials, labour, the necessary and regrettable high prices for gas, control, regulation, increased work through meeting Government requirements—has reached maximum weight, intensity, and effect. It was Mr. Charles Carpenter, D.Sc., who said that, in the management of the gas business, directors were not masters in their own houses. All the business that a gas undertaking transacted has been tethered in some way by Government control. This may be testimony to the indispensability of the gas industry; but the industry would rather have had less of the testimony and more of the freedom. The difficulties and burdens of the whole situation are reflected in the height to which gas prices have soared—prices undreamed of in times past. Through climatic conditions, there was a considerable increase in the consumption of gas early in the year. Then came the rationing business, and the more welcome putting on of the clock by an hour, from March 24 to Sept. 29—the former introducing a big uncertainty. The first half year saw in many places a substantial percentage decline in the consumption of gas; what the new rationing scheme is going to do for the industry is as yet an unknown quantity, as the rationing is still incomplete. In munition areas, gas consumption, of course, kept at high-water mark. These differences in condition and experience are obstacles to any general review. Through the high price of gas, incomes went up to enormous figures. But the outgoings were also enormous; and, owing to the prices of gas, dividends had a disastrous fall, and stock and share values naturally followed the line of sharp decline. What was attempted to remove the injustice to capital holders will be the subject of later reference. As an instance of the remarkable influx of income, take that of the Gas Light and Coke Company. In 1917, the total was £7,029,550; while nearly £5,000,000 was spent on two items alone—raw materials and labour. Almost throughout the year there has been uncertainty as to what was going to happen next; and this uncertainty did not help to ease the worries occasioned by the actual conditions of the general situation. The two sudden increases in the price of coal on top of the one in the preceding autumn, and the wages awards of the Committee on Production as well as the subsequent agreed increase, necessitated further considerable advances in the price of gas. Speaking of the price of gas, there was advocacy of all charges being based on per 100 c.ft. Blackpool and two or three other places adopted the idea, which has been practised for some years by two small Scottish companies under the management of Mr. James J. Scott. The Government could have done more to help the industry had they chosen. They asked of it freely; they gave assistance stintingly, and in some ways not at all.

But if the British gas industry suffered considerably and in much unjustly, the gas undertakings in the countries of our Allies and in enemy countries were in far worse case. Many gas undertakings in the Allied countries were terribly hit through the shortage and heavy prices of coal delivered, notwithstanding the control of prices at the pit head and the rates of freight. In France, a report showed, there had been increases in the prices of gas, ranging in some of the small towns from 61 to 171 p.ct. over pre-war prices. In other cases, too, there were agreements to base increases on a sliding-scale in accordance with the price of coal—2¾d. for every increase of 3 frs. in coal prices. A truly vivid tale of difficulty and costs in the case of the Union des Gaz was told by the Chairman (Col. H. Le Roy Lewis, C.B., C.M.G., D.S.O.) at the recent meeting of the Continental Union Gas Company. In the portions of France and Belgium devastated by the war, gas-works through bombardment, occupation, and evacuation of towns were heavy sufferers. An apt illustration of this was given by Mr. H. E. Jones and the (late) Mr. Williams at the meeting of the European Gas Company. In Germany shortage of labour at the pits and depreciated transport caused considerable difficulty. The failure of the petroleum supply led to householders trying to secure greater gas supplies. The attempt to cut-down consumption proved a failure, and therefore the authorities, according to the accounts that reached us, had to take very drastic measures to ensure compliance with their demands. In Greater Berlin for example, in 1917 an economy of 10 p.ct. was ordered upon the consumption of 1916; but in the result the consumption exceeded that of 1916. Extra charges were collected in respect of the excess consumption. The Imperial Con-

tinental Gas Association have lost their German works in Berlin and Hanover. The story of their sale, told by Sir Charles J. Jessel, Bart., at the annual meeting of the proprietors, showed that this transaction was marked throughout with gross injustice; but the *dénouement* has yet to come. The day of reckoning and settlement is within measurable distance. In neutral countries, too, there was great pressure through want of coal. Further afield, where there were not local supplies—as there are in South Africa and India—the circumstances were far worse; and often there came information of recourse to wood, even maize and damaged grain, and other substitutes for coal, for making gas.

Financial Relief Contest.

We have not space to review the general legislative work of the year; but there is one phase of it that is of importance. Prefacing reference to it, we may say that it is sincerely hoped that the report of the Committee of the Ministry of Reconstruction who dealt with the question of procedure in connection with Private Bills will have good effect. They reported in favour of reducing the cost and simplifying the process of obtaining parliamentary powers, and recommended the setting-up of a general sanctioning authority for granting compulsory powers of purchase of land. The matter which cannot be passed by is that concerning what became known as the question of financial hardships, in connection with which Parliament failed to do even common justice. It is a matter which we raised in the "Journal" during the first year of the war; but the powers that be in the industry did not move in the matter until dividends shrank to skeleton dimensions through the operation of the sliding-scale or the limitations of maximum prices. However, the movement made thirteen months ago by the promotion of a number of Bills in Parliament resulted in the appointment of a Select Committee to inquire into the subject of the relief (if any) that should be given to gas undertakings, and in the end Parliament proved its capacity for inflicting a serious injustice. The Committee were shown that the prices of gas in excess of pre-war rates were due not to indifferent management, but entirely to the increased costs imposed by war conditions, and to the Government control of prices of, and dealings in, the various products of gas undertakings, including those which were required for war purposes. This being so, all war-created disadvantages were additional charges upon production which were not contemplated by the terms of the sliding-scale or when maximum prices were fixed. Therefore, it was unfair that these extra costs should injure those who had supplied the capital which enabled the rendering of the service required by gas consumers. It was not asked that the pre-war dividends should be allowed, but something of a reasonable character which would stop the injury to stock and share holders, and to market values. There was great opposition by local authorities, and not least by the London County Council. There seemed a common desire to wreck the capital of gas companies, and to rob the stock and share holders of a fair return on their capital. The opponents pursued the companies in the House; they maligned them in the Press; they urged before the Committee the injustice to the consumers of doing justice to the stock and share holders who had invested their money on the strength of parliamentary protection. All the companies asked was that Parliament who imposed terms which were at the time considered fair should revise them in the light of an entirely new situation. The details make a long case. The finding of the Select Committee was that, in order to ensure the financial stability of gas undertakings, some relief should be given; but the measure of the relief they put at stopping the decline of the return upon capital at one-half of the standard or maximum dividends—half the standard dividend in many cases meaning 1¾ p.ct., in others 2 p.ct. per annum, less income-tax! The absurdity of the position brought a storm of indignation about the Committee, not only from within the industry, but from financial and commercial men generally. If ever a Parliamentary Commitee played to the gallery, that Committee did; if ever a Committee danced to a tune set by bitter enemies of gas enterprise, that Committee is the one. The President of the Board of Trade (Sir Albert Stanley) brought in a Bill to give effect to the several recommendations, which were extended to electricity, tramway, and water undertakings. Then action was transferred to the House; and the National Gas Council and the Gas Companies' Protection Association, and the gas undertakings throughout the country, informed members of Parliament of the true position. Sir Albert Stanley, when the Bill was before the House, left the matter to its determination; and the speeches of the Right Hon. Sir Daniel F. Goddard, Sir Fortescue Flannery, Mr. R. J. Neville-Neville, and others, together with educative propaganda, resulted in a modest addition being made to the Committee's assessment of what was required to maintain the stability of gas undertakings by making the line at which decline of dividends should stop three-quarters of the standard or maximum, which will (in these times) ensure a ghastly-looking dividend of £2 12s. 6d. and 3 p.ct. to the bulk of ordinary sliding-scale gas capital! Meanwhile, Government were issuing National War Bonds bearing 5 p.ct. interest, with the security of the country behind them. In the House of Lords the contest was continued; but the Bill as amended in the Lower House was carried by a good majority. All the Relief Bills were withdrawn on the new Act receiving the Royal Assent, as well as relief clauses from Bills which dealt with several other matters. Since then there have been a considerable number of applications to the Board of Trade and the Local Government Board for Orders under the Act, which have either been granted, or are awaiting the decision of the Department concerned. This is a bare outline of what was done in the attempt to save the credit of gas undertakings, and what was done outside and inside Parliament to help to destroy that credit. During the discussion of the matter in the House, Sir Albert Stanley hinted that one of the things that would have to be taken in hand after the war would be to adjust the financial conditions of all statutory industries to suit their new economic situation.

In Australia they do things much better, by amending the standard price of gas as justified by increased costs. Just recently we have seen how, in the case of the New South Wales companies, Judge Ferguson has reported, after inquiry, in favour of an increase of the standard price from 3s. 6d. to 4s. 8d.; but by arrangement between the Government and the companies, it was decided that it should not be advanced beyond 4s. 5d., without further consideration by the Government.

Legal.

There were not many cases of outstanding importance in the Law Courts during the year. The Hackney preferential charges case will no doubt be referred to next week in the summary of "Electric Supply Memoranda" for the year. There were two cases which bear upon wartime conditions as to coal supplies, coal quality, and washing gas for the production of benzol and toluol for war purposes. The difficulties are all too well known to our readers; but the Portsmouth and the Brighton Town Councils could find no extenuating circumstances in these things for the local gas companies not complying with the calorific standard of 500 B.Th.U. The Portsea Island Gas Company were summoned and fined for showing deficiencies of 2 to 16 p.ct. on the standard. The Brighton Company, who were very hard put to it for coal and oil supplies, and had to stretch their gas, were also fined. But later the Borough Recorder quashed the conviction; the Recorder appreciating that the Company had to make choice between a low calorific power gas while maintaining pressure, or courting a stoppage of the gas supply of Brighton in midwinter. After this a regulation was issued by the Admiralty, the Army Council, and the Ministry of Munitions, under which they had power to order gas to be made and treated as they thought proper, regardless of standards.

The Secondary Products.

The secondary products during the year have not contributed anything like so much as they would have done to revenue had they not been under control. In the greater part of the year, in many districts coke stocks were very heavy—heavier than they should have been considering the coal and transport position. But in the latter weeks, they fell through the increased stringency of the coal situation, until reports came that they were well below the normal, and in some places there was difficulty in keeping pace with the demand. Of course, prices went up in proportion with coal. The Coal Controller took coke under his wing. There were complaints to him about the accumulations of stock which were taking place; and, in his new rationing scheme, he gave us to understand that he had drawn up the allowances

with the view to the utilization of coke. He urged steam users to burn it; and in the domestic rationing he allowed 3 tons of coke for 2 tons of coal. Subsequently he brought coke prices under control, which—especially in connection with the prices allowed for industrial use—gave rise to very great discontent in the industry, and there were several interviews with him by representatives of the National Gas Council. The prices were unfair; and the remonstrance was just. It is hoped by the gas industry that the large experience obtained in the use of coke will have good effect in the future, especially for steam-raising purposes. The figures that Mr. E. W. L. Nicol, the technical expert of the London Coke Sales Committee, has published in our pages this year as to the evaporative duty of coke compared with coal of various descriptions, show that coke has a good value in it. But there are those accumulations during the year. They remind of the mountainous stocks before the war; and they suggest that the industry will have to exercise much care now and henceforth as to how the coke question is handled. Coke has not been of an attractive quality during the war; and steam-boiler owners have in many cases found this out. Whatever the percentage of ash in the coal that is carbonized, the percentage of ash is greater in the coke, seeing that the quantity of ash in a ton of coal is incorporated in the 14 or 15 cwt. or so of coke produced. To maintain the market for coke in industry, and to extend it, the question of ash in coal will have to receive very serious attention, as well as the quantity of moisture in the coke. However, the year has further proved that when coke is used properly for steam-raising and other purposes, there is economy in it compared with all-coal use. Several steam-boiler users—electricity stations among others—have borne witness to this. The use of coke for road traction is also growing. The outlook is good for larger markets; but there must be protection of the position by an improvement of the coke itself, compared with wartime quality through the condition of the coal.

The position in regard to tar prices did not change much; but pitch has had, from convenient ports to the Continent, a good rise in price. With the improvement of shipping, we ought soon to see a heavy demand for pitch and generally excellent prices. A matter of considerable interest has been the proposed agreement with the tar distillers for the sale and purchase of tar on a profit-sharing basis; but a feature to which considerable objection was taken—objection to which Mr. H. E. Jones gave voice—was the ten-year bond which the scheme entails. This long period was desired by the distillers, without sellers knowing anything as to developments that may take place; so ensuring that the producers should not for ten years participate in any co-operative working between gas undertakings, or adopt on their own account private tar-distilling plants. The dissatisfaction has led to the first scheme being for five years instead of ten; but, at the end of the third year, a further agreement for the period of ten years following the expiration of the five years' agreement is to be brought forward for consideration and decision. The agreement does not apply to Scotland. Mr. J. P. Leather, in his Presidential Address to the Manchester Institution, related his experiences in tar distillation—not going beyond crude naphtha, light oil, creosote, and anthracene. As to the financial result, he said that, after deducting all expenses, and allowing for interest and depreciation, he obtained 80 p.ct. more than the best price received from the tar distillers immediately before starting to work the plant. The cost of the plant, which is being paid for out of revenue, he added, would be entirely recouped in two years' time. This is highly satisfactory. So is the testimony from Plymouth as to the successful working there of the tar-distilling plant to which many gas undertakings send their produce. From some quarters came report as to the increased demand for dehydrated tar for road purposes. But at the Midland and Eastern Counties meetings there were great complaints of overrunning tar-tanks and idle dehydrating plants through the limited use of the tar for roads. According to the report of the Road Board, a bulk allocation of 47 million gallons was made to them for the year, which they in turn allocated among the highway authorities. The working of dehydration plants again came in for some amount of discussion at technical meetings. Tar oils were much sought after by Diesel engine users, who are finding considerable economy in their use.

The benzol position is extremely interesting. Gas undertakings have been relieved from their obligation to wash for its recovery; it is optional whether or not they do so. But it is to the interest of the country that they should do so; more especially as the calorific value of the gas is only affected to the extent of about 2 p.ct. with tar washing and 5 p.ct. with oil washing. The demand for motor spirit is going to be very great; and benzol, it has been shown, contains more power in it than petrol. But it must be of a suitable quality. Mr. S. E. Whitehead, who has been assisting Mr. W. Doig Gibb in the Explosives Department of the Ministry of Munitions, in an article in our columns a fortnight ago, dealt with these matters, and gave good reason why the benzol plants now in existence should be kept going. He also advocated research for the purpose of preparing a specification for benzol for motor use. The National Benzol Association was formed towards the end of the year; and, among much else, the subject of a specification is to engage their attention. The Board of Trade after the armistice was signed announced that motor users could obtain supplementary benzol licences which would authorize the purchase of benzol to an extent exceeding by 50 p.ct. the amount of petrol allowed. This was a considerable concession, seeing that benzol has 15 to 20 p.ct. more power in it. The technical work associated with benzol recovery and rectification received during the year a good deal of consideration. The dye industry has also had much attention bestowed upon it. An amalgamation has been effected between British Dyes Limited and Levinsteins; and they will operate now as the British Dyestuffs Corporation, Huddersfield or Blackley (as the case may be). The Government are rendering further financial assistance; and there is to be protection by a system of control of importation by licences for not less than ten years after the war, so as to allow of a period of development.

The demand for sulphate of ammonia has been maintained, and, in fact, has been on the increase, owing to the propaganda work by the Board of Agriculture and the Sulphate of Ammonia Association. The controlled prices have been somewhat better; but the working expenses have gone up, owing to the higher controlled price for sulphuric acid (the supply of which has been somewhat better), for which increases, however, makers have been compensated by the Government. The details of the prices of sulphate and of sulphuric acid have been published in our columns; and we cannot enter into them here. With the war-time erected plants, there ought to be a considerable supply of sulphuric acid at reasonable rates as soon as control ceases. During the year, gas-works were urged to produce more sulphate of ammonia; but coal supplies and gas rationing were against them doing so. In future, steps will have to be taken to produce as economically as may be, to make all possible, and to prevent loss of ammonia, as with the progress of time there is no question we shall be up against a stiff competition not only from synthetic ammonia, but from other sources. Besides, other countries where British makers used to do business have been manufacturing sulphate on their own account; and so our home market will have to receive very close attention to stimulate business. A large amount of interesting information was given in the report of the Sulphate of Ammonia Association published in the "JOURNAL" for Nov. 5. Among other points, it was seen that the production of a neutral salt is now practicable; and the elimination of free acid is essential as a very important commercial consideration. The Ministry of Munitions completed arrangements for the production on a large scale of atmospheric nitrogen; and it is expected by them that this source of supply will be of "great value" after the war for the production of fertilizers. The Chief Inspector under the Alkali Works Regulation Act (Mr. W. S. Curphey) reported that there had been a somewhat extended use of nitre cake in part substitution for sulphuric acid; and this was the subject of an article in our columns on Aug. 27, written by Mr. P. Parrish. In his last annual report, Mr. Curphey also discussed the methods adopted to obtain improved results from the direct process of manufacturing sulphate. Nitrate of soda continued unobtainable for fertilizing purposes; being required for munitions manufacture. The quantity of concentrated ammonia produced in 1917 was large; but according to reports a number of the plants were rendered idle this year. And Mr. Parrish, at the recent Southern Association meeting, considered how these plants could be turned to good use in connection with liquid purification. Concentrated ammonia liquor has been the subject of much discussion. The sources of loss during the manufacture of it received consideration by Mr. Arthur

Marsden; while Dr. Harold G. Colman and Mr. E. W. Yeoman, B.Sc., were recently imparting information upon the question of its impurities.

LABOUR TOPICS.

As to labour questions during the year, columns would be required to review them; and so we must be excused, though the subject is of front-rank importance. Looking back and looking forward, the position is a critical one; and we may be sure of this, that the standards of pay for labour will henceforth have a different value from those that existed before the war, and that labour will have a larger influence in industry than hitherto. But it is to be hoped that the influence will take a pacific form which will tend to larger industrial prosperity, as then all classes will reap some advantage. That is the ambition of the Whitley Committee, whose scheme for Industrial Councils is making a move. But, judging from the pushing-up from behind by Government Departments, it would seem that the pace is not so rapid as they could wish. If, however, the Government take the matter in hand seriously, Industrial Councils will soon be obligatory. Pending adequate organization, and the adjustment of certain differences affecting municipal and company undertakings, nothing definite has been done in the establishment of an Industrial Council in the gas industry. But every now and again there has been allusion to the matter; and it is expected that a Council will in due season be in existence in the industry. These Councils, it is proposed, should deal not only with wages and labour conditions, but through them the workers should be made to feel that they have a real interest in the concern in which they are engaged. Co-partnership offers a means of establishing all that is covered by the term "real interest." But singularly enough, in their final report, the Whitley Committee said that, after consideration of the evidence at present available, they had come to the conclusion that they were not justified in putting forward any general recommendations as to profit-sharing and co-partnership. But co-partnership, as has been repeatedly shown—latterly in a paper by Mr. Charles Carpenter, D.Sc.—stands firm, in spite of the fierce hostile conditions (particularly the absence in some cases of any bonus) of the present times. The Gas Light and Coke Company (of which Mr. D. Milne Watson has lately been elected Governor) have altered their scheme so that the bonus is based on the rate of dividend on the ordinary stock, which, while giving uniformity to dividend and bonus, protects the employee co-partners against absolute deprivation of bonus so long as a dividend is being paid. The South Suburban Company, like a few other companies, have adopted a minimum bonus. At Plymouth, the co-partnership scheme was abandoned, owing to the defection of the men and disintegration due to the operations of the Dockers' Union.

The year's experiences, however, have not helped to strengthen the hope that, under new conditions, peace is going to reign in industry. War time living conditions and (where labour is concerned) a flexible Government, have whetted appetites in some industries to such an extent that excesses of demand and profiteering that is condemned in others have been freely indulged in by the employees. The Government, too, have by Act secured for six months the maintenance of the minimum wages generally applicable at the date of the signing of the armistice. Some unions have intimated that they are going to adhere to war time wages being recognized as normal wages, even when the cost of living diminishes—that is to say, even when the purpose for which the additional wages were given largely disappears, they intend to claim their continuance. This does not look like peace or justice. Wages will have to be higher in future than in pre-war times; but labour must not attempt to kill the industry which gives them and other people whose brains are as necessary as the workers' hands the means of subsistence. While millions of men have been fighting and facing death, there has been at home constant disturbance in the labour world, even in the classes of employment that receive the highest wages. Sometimes there has been a measure of justification for urging a revision of conditions; but in war time, there can be no justification whatever for disorganizing work, and throwing the country's system out of gear, as in the railway strike during September. There have been strikes in the gas industry. Fortunately they were short-lived ones. We cannot go into details again. There has been much trouble over both wages and bonuses; and many appeals to the Committee of Production. Increases in wages were wanted; the celebrated and much-abused 12½ p.ct. was wanted by all—in fact, wants appeared to be interminable. War bonus became war wages, and as such rank in respect of overtime. There came the demands of the National Federation of General Workers, which caused large consternation in the already much overburdened gas industry. The terms of the award which resulted from these demands were published in the "JOURNAL" for April 9 [pp. 45, 50]. But the generous award then made did not long give satisfaction. Another demand was soon preferred, upon which a settlement was effected, the terms of which were mentioned in our issue for Oct. 15 [p. 112]. Concurrently upon these increases, Col. Will Thorne, the Secretary of the National Union of General Workers, stated that they affected 100,000 workers, who were getting an average increase over pre-war wages of 23s. 6d. per week, *plus* 12½ p.ct. The 23s. 6d. would mean for 100,000 workers upwards of 6 millions sterling, and with (say) 2 millions for the 12½ p.ct., the wages bill of the gas industry for these 100,000 workers alone shows a war increase of upwards of 8 millions sterling. In all these matters the National Gas Council were being kept continually on the alert, and were constantly engaged with the several Government Departments concerned.

Apart from wages, the pressure of the shortness of labour increased. The military position in the spring demanded more men. Revised schedules of protected occupations were issued; and sweeping powers were taken for dealing with exemption certificates. The new Military Service Act was passed, which raised the age limit, and so caused a large number of men to become liable to serve in the Forces. A great many men were removed from industries and other occupations; and then the American Forces increased to such an extent that it was possible to ease-off the serious drain on man power in this country. In the gas industry, the help received from women workers in all departments has been beyond estimation and praise. We could not have gone on without them. They have worked well, and have added a new chapter to the history of the gas industry. Their penetration into all branches of its work reached the limit when, at the Vauxhall station of the South Metropolitan Gas Company, women took over the operation of three machine-worked retort-houses. Early in the year a special descriptive article with this remarkable innovation as the subject appeared in our pages. More recently, we have seen women scoop-charging at Woking, where most of the other operations are also being temporarily performed by women. We have also in a still more recent article given an indication of the assistance that the Dilution Section of the Labour Department of the Ministry of Munitions have been to the industry. But now it is not dilution but demobilization that is being talked about; and men with places awaiting them (as in the gas industry) and pivotal men are to be the first to be demobilized. We are hoping before long to hear that the gas industry has, in view of the principles adopted by the Government for initial demobilization, a return of workers in good numbers. With the necessary supply of materials, the industry could now give employment to a considerable number of men; and, in common with other industries, it asks the Government to remove with all possible expedition the fetters of control from materials.

THE OUTLOOK.

Though we have been passing through times unparalleled for their strenuous claims and injury-inflicting conditions, these will ease as time passes. They have already begun to do so. In some respects control, certificates, permits (there have been some newcomers in respect of control during the year) are being withdrawn. Government departments are lessening their activities, and are commencing the process of dissolution, which will end in final extinction. There are also signs of a beginning of relaxation in respect of capital issues. There will be a gradual return of labour; and a gradual release of materials. The coal situation, it may be anticipated, will during the spring and summer become less tense; and altogether greater freedom will break through, and slowly expand. We must not, however, place our expectations too high for the immediate future. The mass of difficulty that has been built up during the past four years and nearly six months cannot melt away in a few days or weeks by the sunshine created by the cessation of hostilities and the approaching peace. A considerable period will be requisite to conform things to anything approaching the old,

or rather new, time order. The financial burdens created by the war will have to be reckoned with; money for capital purposes will continue to be dearer; and wages and prices of raw and finished materials, plant, and goods higher than the quondam normal will have to be faced. On the other hand, the whole country is talking of reconstruction, new industries are developing, and old ones are seeking expansion. The country is to be brought to a more self-contained state; and a big and sustained effort, it is anticipated, will be made with the view of developing business not only at home, but in all parts of the world. The gas industry will share in this if it does its duty to itself. There is a call for cheaper gas for fuel—both domestic and industrial. Costs will be antagonistic. The only method of meeting what is wanted will be by getting the utmost value out of every ton of coal used—value in B.Th.U. in gaseous form and value in the secondary products. Nothing whatever must be lost, and waste must be evicted from our operations. Concurrently, everything possible must be done by manufacturers of gas plant and consuming appliances to raise their efficiency, and increase their scope. We have to keep our eyes on all movements. Our electrical competitors are increasing their activities—technical and commercial; and reorganization is penetrating every part of their work. The coal merchants are jealous; and any instrument is now good enough for certain of them to attempt to destroy the progress of the gas industry in heating operations. We must see that they are frustrated, and that the value and merit we can offer transcend those of electrical competitors.

Among the other movements of the year which are promising, but which we can only mention incidentally, are the great housing scheme, industrial requirements—furnaces, gas-firing of boilers, and gas-engines—and gas traction, in which good progress has been made. Industrial uses point to gas-works with areas in which manufactories are concentrated, piping to them a useful power gas. With their coke, gas-works have the means of doing this; and it ought to be the ambition of the owners of every gas-works to become the dominant fuel suppliers in their area. National Kitchens (which have been utilized so largely to give electricity a chance in oven work, but which has in all other operations fallen lamentably short in acceptable performance) have pointed to a direction in which the industry must exert itself to prove its superior efficiency and range, and to kill misconception. Industrial canteen work is a promising line to follow up; the experience in munition works having been highly valuable. The British Commercial Gas Association have done immense good in this connection, more especially in the recent exposure of the claims of electric-cookers. The manufacturers have to work for higher efficiencies from boiler-rings. Sir Dugald Clerk says there is no reason why they should not get up to about 70 to 75 p.ct. Gas-fires—their burners, regulators, and radiants—have to be made to suit the character of the gas that is coming. Very helpful to the industry proved the attack made on the use of flueless radiators in a Coroner's Court, upon which reports were penned by Dr. W. H. Hurtley and Mr. J. H. Coste. The helpfulness came through a very searching criticism of the reports in an article contributed to our columns by Messrs. Fletcher, Russell, and Co., to which article reply has not been made. With regard to secondary products, from mostly all quarters—there are isolated exceptions—came the opinion that the gas industry must in the national interests continue the recovery of benzol, seeing that its extraction has so little effect upon the calorific value of the gas, and its value is great as a motor fuel and to the dye and other industries. As has been seen, there are now better prospects for coke. Its enforced use during the war has helped it. The gas industry has to improve its attractions as a fuel by the better preparation of the coal used for carbonization, so as to reduce the ash content, and promote better physical characteristics. Moisture, too, must be lessened, as consumers do not want to pay for water the price of carbon. Sulphate of ammonia has had a good advertisement among the agriculturists, through the need for intensive cultivation. This should be valuable for the future. But the gas industry must not overlook the competition that is coming and will grow.

The outlook is good, if full advantage be taken of it. To take full advantage, there must be efficiency at the top of our undertakings. They must be sagaciously administered; and the chief officers must be men of sound and sufficient training and judgment. It has been seen during the year how our universities and colleges are shaping themselves for the higher scientific training of young men for the industries. It is recognized that there must be the greatest scientific supervision of processes to get the maximum results. The developments in the gas industry demand this, and so does the necessity for economy. Our administrators must all support and encourage these educational efforts. The industry needs intellectual development; brains and skill being as essential as muscle. There must be support of research. The future of our industry—its technical and economic progress—depends much on this. Work, as has been seen, is proceeding in connection with the industry's methods of coal utilization and the character of its gas. The Refractories Research Committee of the Institution is once more active, with Dr. Mellor directing. The Privy Council Committee for Scientific and Industrial Research are urging the promotion of Research Associations; and everything possible is being done to promote them. Organized research is a national asset, and it is an asset in any individual industry. Typical of what has been done during the war through research was seen at the Scientific Products Exhibition and the New British and Key Industries Exhibition. These are not the times to be content with pursuing the old ways. Our outlook is altogether different from the old; and requirements have undergone complete metamorphosis.

Investigation into Position and Policy.

We have said enough to show that in the new conditions in which the gas industry finds itself—economic and competitive—it is very desirable there should be a thorough investigation into its position, and new lines of policy and standards be fashioned for it. During the year, this has been a feature in the editorial work of the "JOURNAL." Sir Arthur Duckham initiated the idea by speeches made on sundry occasions—first at a meeting of the National Gas Council, and then at private functions. From the Presidential Chair of the Institution, Lord Moulton delivered a brilliant address which, when we grasp its meanings rightly, is a criticism of the apathy of the industry, a warning which invokes greater activity and urges an abandonment of the course which allows things to remain as they are, and development to take place as it wills, without any attempt to properly cultivate it. The address was a bugle call to the industry, throughout which its silvery notes vibrated with profound effect. They stirred many men to new thoughts and beliefs. Legislation, standards, policy all need revision. The industry has been content to go along with enactment which has stunted growth and repressed productive economy. All this needs changing—now; and subsequently (as it should have been in the past) periodically, as new development, the disclosure of fresh potentiality, and the opening-up of new opportunity, permit. The electrical industry is alive to the value of impressing the Government with its national importance; the gas industry does nothing of the kind. The electrical industry has had an inquiry by a Sub-Committee appointed by the Coal Conservation Committee of the Ministry of Reconstruction; another Committee has dealt with the trade development of the industry; and the Electric Power Supply Committee of the Board of Trade has also reported. The result is that the political powers are impressed with the importance of the electricity industry in our national development. Though practically everything the gas industry produces has been wanted by the Government for the conduct of the war and the provisioning and sustenance of the people at home, the Government has accepted it all purely as a matter of course. The service rendered will, if there be not great care, slip into the background among forgotten things. There has been no thought in Government departments, despite the facts of wartime service, to do anything for the industry. The industry itself is partly to blame. There has been too much indifference to external movements and developments, and to internal potentiality. There was hope at one time that the President of the Board of Trade would have moved in the matter of instituting an inquiry. We believe that he referred the matter to Dr. Addison, the Minister of Reconstruction. The Carbonization Sub-Committee of the Coal Conservation Committee found excuse in the fact that the Board of Fuel Research are in existence, for not saying anything regarding the work or possibilities of the gas industry; while, on the other hand, the Institution of Gas Engineers have in course of preparation a report which, we fully believe, will be a revelation to the Government authorities. The investigation we and others had in mind, including

leading men in the National Gas Council, has, however, a larger scope than the questions of coal economy and gas quality. Some of the District Associations—the North of England and the Wales and Monmouthshire leading—passed resolutions urging upon the National Gas Council to take effective steps to secure an investigation from which it was certain the industry would issue in a manner which would commend it to the Government as worthy of the fullest possible support in the development of its resources, and through them the domestic conveniences and interests of the country. The National Gas Council were already in touch with Government Departments regarding the suggestion. But the year closes; and in this matter the industry is much as it was. The electric industry has played its cards better. A Bill is said to be in preparation to set up a Board of Electricity Commissioners and District Boards to develop the industry on more economical lines; and even Government financial support is suggested. The Prime Minister is one who has spoken favourably of electrical power production; but in a recent address at Manchester, dealing generally with trade after the war, he said what is wanted is not reaction, nor revolution, but sound, well-devised, and bold reconstruction. That is what the gas industry desires. It wants to do its share. But it wants its whole position—legislative, financial, technical, and trading—inquired into, so that new and complete lines of policy may be defined. For this, there has been a good deal of support in Presidential Address and in speeches, as well as favourable opinion privately expressed.

Reorganization—The National Gas Council and Organizing the Gas Undertakings.

During the war there has been great need of a central organization in the industry empowered to speak and act authoritatively. The National Gas Council has done its best in keeping watch and ward. It has been the body with which Government Departments have communicated, conferred, and negotiated as representing the gas industry. It has intervened in many directions, and has represented the views of the industry. But it has always to be remembered that Government Departments have superior power over a body accredited by the gas industry. Decisions have not always been what were wanted by the industry; but we know that on many occasions decisions would have been much worse had it not been for the presence of the Council. No one knew the weaknesses of the Council better than those who were the executive workers. It is years since in these pages complete and effective organization for the industry was advocated. We have adhered to that view; we adhere to it now. This year the call for reorganization has become more insistent. The call has been heard not only through our pages, but at many meetings—particularly through Lord Moulton at the Institution meeting, and at private functions connected with the British Commercial Gas Association and the Society of British Gas Industries. The voice of Sir Hallewell Rogers, in his last Presidential utterances at the annual meeting of the British Commercial Gas Association, put in a plea for thoroughness in unifying the industry, so as to press forward with full strength.

But reconstruction problems will not wait for the building-up of a new and complete organization. It is something that requires thorough planning to the last detail. The National Gas Council came to the conclusion that something would have to be done, but the something could not be a scheme which would take a considerable time to work out, and to bring into being. The Council itself—being constituted and financed by the Institution, the British Commercial Gas Association, the Gas Companies' Protection Association, and the Society of British Gas Industries—was not a representative body of the gas industry. It was simply nominated, without due authority and independence. By a happy thought, it occurred to the Chairman of the Executive Committee (Mr. D. Milne Watson) that the reformation of the Council would be a good opportunity for attempting to effect the organization of the gas undertakings of the United Kingdom, as well as to secure for the Council financial independence. In this proposal, the President (Mr. H. E. Jones) and the Committees heartily concurred. The scheme proposes representation of the Institution, the British Commercial Gas Association, and the Gas Companies' Protection Association; and a Joint Standing Committee will be formed upon which will be represented the Society of British Gas Industries, the Sulphate of Ammonia and Benzol Associations, and any other eligible trading organization. The scheme for organizing gas undertakings is by means of a number of District Boards, formed by the undertakings themselves within a defined area. These District Boards will be properly constituted, and have their own official machinery and separate meetings. They will deal with their own local affairs, and will elect their own representatives to serve on the Central Executive Board. From a nominated body the National Gas Council will become an elected one, and will thus become representative of the gas undertakings of the whole kingdom, and the gas undertakings are the body and soul of the industry. Strange it is they have never been organized before. But now of all times they must be; for political and economic questions are pressing, and must—it is vital to the industry—be attended to promptly and with authority during the period of reconstruction. The gas undertakings cannot look after these matters as units; the work must be done unitedly.

Having got the gas undertakings united—company and municipal—in the National Gas Council, it will be for this body, as announced by Mr. Milne Watson at the meeting of representatives of gas undertakings last month, to appoint a Joint Committee of the five organizations—the Council, the Institution of Gas Engineers, the British Commercial Gas Association, the Gas Companies' Protection Association, and the Society of British Gas Industries—to investigate and evolve a scheme so as to weld them into one (possibly sectionized) organization, which shall produce conditions that will harmonize with the importance and dignity of the industry. Thus the new Council will be the means to an end which most men in the industry desire; and it will be a stronger end than could possibly be produced without due premeditation. There was a suggestion made by Mr. Charles Carpenter, D.Sc., that the gas companies should separate themselves from the municipalities, and extend the scope of the Gas Companies' Protection Association for the purpose. The idea of division fell flat, and was resented on all hands. Mr. Carpenter later proposed that complete organization should at once be taken in hand; and Mr. Charles Hunt and others concurred. But again there were few followers. The organization of the gas undertakings as the National Gas Council and the subsequent consideration of the whole question by the several organizations is now accepted, almost universally, as the most statesmanlike proposal; and the Society of British Gas Industries are now more contented over their own position. Final organization of the industry without the Society would be to deprive organization of a vital member. The parts of the machinery for the new National Gas Council are now being assembled.

One point over which there has been an amount of controversy has been the Employers' Committee to deal with labour questions. Membership of this Committee is to be optional on the part of members of the National Council; and members of the National Council who are not members of the Committee will not take part in the proceedings of the latter. Only membership of the Committee will bind to acceptance of its decisions. There must be some body of the kind in the gas industry to take part in the Joint Standing Industrial Council that is expected to be formed under the Whitley scheme. Mr. Carpenter took the lead, as a member of the Institution of Gas Engineers and the Gas Companies' Protection Association, in trying to get an entirely "separate organization" for dealing with labour questions; and at the Institution meeting in the autumn, he described what had been done in the chemical industry, in forming a Federation of Employers wholly detached from the Chemical Manufacturers' Association. On that occasion he got the following addendum put to a resolution approving the reconstitution scheme for the National Gas Council: "Provided a separate organization is formed to deal with labour matters." But it is clear the Institution views the National Gas Council proposal of an Employers' Committee as a "separate organization." Mr. Carpenter does not; and when he raised the point at the meeting of representatives of gas undertakings in November, he found around him an unsympathetic audience, united in giving support to the proposal of the Council. It is a matter for congratulation to Mr. Milne Watson that the scheme, for the structural details of which he is so largely responsible, met with favour falling so little short of universal.

During the year the Scottish Gas Council was formed; and it is working in close co-operation with the national body, upon which it is directly represented.

OTHER ORGANIZATIONS OF THE INDUSTRY.

The Institution of Gas Engineers during the year has been doing some excellent constructive work. The brilliant address delivered by the late President (Lord Moulton) has already been incidentally mentioned. Lord Moulton is the new President of the British Commercial Gas Association and the Society of British Gas Industries. In the Presidential Chair of the Institution, he has been succeeded by Mr. Samuel Glover, who is throwing considerable energy into the work. An innovation was created this year by holding an autumn meeting, at which the Gas Investigation Committee presented a report of considerable educative value upon their preliminary investigations into various grades and compositions of gas. It would have had greater value still if the appliances in which the gases were consumed in making the tests had been beyond reproach. As mentioned elsewhere through the Meter Research Committee, Mr. J. G. Taplay and Mr. B. R. Parkinson submitted papers showing how changes in the composition of gas, the diminution of oil for carburetting gas, the use of blue water gas, and the extraction of benzol were affecting and causing deterioration of meters and their leathers. They also offered advice as to how to correct the conditions, and to preserve meters from ill-effects. On the same occasion, Dr. Mellor presented a report, including the results of experiments by Mr. Walter Emery, on the corrosive action of flue dust on refractories.

The British Commercial Gas Association has done excellent work during the year in many ways suggested by wartime developments; and very effective has been the handling of new situations. The work done is not always so visible as an illuminated sign; but it is going on nevertheless. The Executive (who continue to work under the energetic chairmanship of Mr. F. W. Goodenough) are also putting by a nest egg to help with the post-war campaign as soon as the industry is ready for it. Sir Hallewell Rogers's address at the annual meeting possessed a good breadth of view, and displayed a tight grip of the problems facing the industry. The Gas Companies' Protection Association took good part in the financial relief campaign. The Society of British Gas Industries had a voluminous address from Sir Robert Hadfield, Bart.; the compilation containing much of considerable value. Thoughtful was the address that Mr. Archibald P. Main, the new Chairman of the Council of the Society, gave at the autumn meeting, on "The Waste and Conservation of Capital." We cannot touch even lightly upon the work of the District and Junior organizations; nor upon that of kindred bodies. But nearly all that has been done points to the broader outlook that is being taken and the recognition of larger responsibilities and opportunities.

In the retrospect of this year, we have left unnoticed many things that ordinarily have place in it; but it has been a year so full of events—some transitory, some permanent, some portentous, some directive for the future—that this must be the excuse for omission. We have had our losses (some sad ones); we have had our gains. An honourable part has been taken by the industry in securing victory. We look with great hopefulness to the future. Let us stand shoulder to shoulder from the beginning of the New Year, full of resolve to carry our industry along new paths to that greater territory which it has the right to occupy, and all will be well.

In the New Parliament.

Public opinion has elected the new House of Commons with a large working majority for the Coalition Government. It has shown its will in an unmistakable manner, by making a clean sweep of pacifists, and several of the labour extremists; and it has not considered the time is ripe for ladies to take part (only one woman has been awarded a seat in the House) in the legislative work of the country. It has been a remarkable election in more ways than one. There has been the increased voting power, which has been so largely exercised by the women of the country; and there have been the additional energy and competition of opposing elements, including labour. The electorate, however, had in mind the important and far-reaching peace settlement that has to be discussed and effected; the part that this country has to take in protecting the interests of the world in future against a repetition of their disturbance in the manner of nearly four-and-a-half years ago; and the important reconstruction problems for the homeland that have to be solved and dealt with. The will of the people is that all these matters shall be entrusted to the Government that has done such a large part in bringing us to victory. We are sorry that in the new Parliament we shall not have Sir Daniel F. Goddard, who resigned with the outgoing Parliament his representation at Ipswich; and that Mr. R. J. Neville-Neville, the Chairman of the Brentford Gas Company, has been defeated at Wigan by 1330 votes, though he polled 11,584. Sir J. Fortescue Flannery (one of the Directors of the South Suburban Gas Company) remains as the only representative of the gas industry's prominent trio in the House.

Other Members.

But still we have others. Sir W. H. Cowan retains his seat for Aberdeen and Kincardine (E.); and there is Sir Edward Goulding, Bart., who is a Director of the Continental Union Gas Company, in for Worcester. There is Mr. H. Pike Pease again representing Darlington; and Sir E. A. Brotherton will sit for Wakefield. An old friend of the gas industry is the Rt. Hon. Lord Robert Cecil, who retains his seat for Herts (Hitchin); and among other friends (so long as one does not talk of the gas industry's expansion in dealing with secondary products) is Sir William Pearce, who will look after the interests of Stepney, in the Limehouse Division. We have also Sir Alfred Mond in for Swansea (West). Mr. Will Thorne (who is a robust representative of patriotic labour) secured a tremendous triumph at West Ham (Plaistow). The President of the Board of Trade—Sir Albert Stanley—who is much interested in the electrical problems of the country, in the financial reformation of statutory industry under the new economic conditions, and in much else the gas industry is concerned in, has been returned for Ashton-under-Lyne. It will be necessary to keep careful pace with the movements of Sir Albert in the new Parliament, and to seek his good offices on behalf of the gas industry, particularly in view of the national electrical scheme being an item in the reconstruction policy of the Government. One member who will also be interested in the movements of the President in connection with the financial modifications of statutory undertakings under the new conditions will be Sir William Middlebrook, who was Chairman of the Financial "Relief" Committee of the House of Commons, and who has been returned for Leeds (South). Another Department in which the gas industry will be closely interested will be the Ministry of Reconstruction, at the head of which we may expect to again find Dr. Addison, who has been returned for Shoreditch. Sir Phillip Magnus most appropriately continues to sit for the London University.

Gas Coal Stocks at a Low Level.

The low point to which the coal stocks of some gas-works have fallen is shown by the fact that, in the early weeks of December, notwithstanding the instructions received by collieries from the Coal Controller, special official orders were circulated for emergency supplies to be sent where the stocks were in a critical state. In the "Iron and Coal Trades Review" for the 20th inst., allusion is made to the revised instructions of the Coal Controller in regard to priority. Our contemporary considers that the change will make little difference in the matter of increased tonnages available for either house or gas purposes, seeing that for the most part railways and bunkers use steam coal, so that to a very large extent the new order of priority will in reality have little effect. Orders were also issued "that for the two days immediately preceding the Christmas holidays, supplies to munition works and industrial undertakings of fuel suitable for household purposes, and for use in gas and electricity works, and for railways, shall be discontinued, and diverted to the four last-mentioned purposes." It was also intimated by the "Review" that a list of gas and electricity works had been sent to collieries with the latest instructions, showing the position of their stocks; and collieries were asked to make larger deliveries to those they had contracts with, or who were usually supplied by them. This list showed 41 gas-works with under one week's stock; 64 with under two weeks' stock; and 28 with over four weeks' stock. Of electricity works, 9 had under two weeks' stock; and 28 over four weeks' stock. The works having over four weeks' stock were,

apparently, given as a guide to collieries that they did not require any particular attention. Generally (our contemporary remarks) the question of supplies for electricity works is not an urgent one, as for the most part the fuel they use is not suitable for house and gas purposes, which perhaps explains the fact of 105 gas-works having under two weeks' stock, as against only 9 electricity works. "For the time being it will be impossible for collieries to satisfy the demands for house and gas coal, as if gas concerns are to have anything like the deliveries they could easily deal with, in view of the holidays and the longer period of darkness, it will be entirely out of the question for collieries to deliver the tonnages promised by the Coal Controller to merchants."

Revocation of an Order Cancelled by Another.

The abrogation by the Board of Trade of the Order referring to the time limit at which meals may be served by hotels, restaurants, and clubs, and lights may be used in places of entertainment, might just as well have been brought about with the coming into operation of the Fuel and Lighting Order; for it is an advantage that appears to benefit no one in a material manner, save hotels. In the case of restaurants, the greatest difficulty appears to be experienced in keeping within the rations permitted by the Fuel and Lighting Order, which therefore cancels the benefit conferred by the liberty as to hours. In the case of hotels, the difficulty is not so great. Owing to the number of the rooms in them, the fuel and lighting rations work out to really generous figures in comparison with restaurants, so that they have nothing but pleasure in the return of freedom as to meals. And where they have public restaurants or grill rooms attached to the hotels, they can compete with the ordinary restaurants farther into the night, and do a heavier business. Theatres appreciate the change, as they will be able to start at a later hour, and yet not add to their expenditure of light or fuel for heating. In the case of lighting shop windows, this again has its limits imposed by the Fuel and Lighting Order.

Oil Fuel in the Boiler-House.

In an article by Mr. C. M. Bennett, in the "Electrical Review," he discusses the question of utilizing oil fuel as a supplement to solid fuel, particularly at the time of heavy demand for steam, or at electric light stations on sudden emergencies such as fogs, or for boosting-up inefficient boiler plants. Those who have made a close study of boiler-house conditions have come to the conclusion that there is something still wanting—some addition to the mechanical stokers—to make the system of steam-raising more elastic, and more responsive to demands, especially when inferior fuel is being used. Mr. Bennett finds the auxiliary in the oil-fuel burner. Just before the war, experiments were made which showed that by employing oil-fuel burners in boiler furnaces not only lower grades of fuel could be burnt which were otherwise considered useless, but that, even with the higher grades of fuel, better and more perfect conditions were at once established. The article suggests that the oil-fuel burner is an indispensable adjunct, if it is desired to get the utmost out of mechanically fired boilers, and to extend the range both of steam-raising service and the character of solid fuel which can be employed. Economy is thereby promoted. The idea may be of use in connection with the utilizing of coke for steam-raising when a little intensifying at the peak loads of steam demand may be needed.

Last Year's Coal Mines Report.

Some figures extracted from the statistics for the year 1917 dealing with the output of the mines and quarries of the United Kingdom, which are issued by the Home Office, will be found on another page. The tale they tell is, of course, one with which conditions have rendered "JOURNAL" readers familiar. Whereas in 1916 the output of coal exceeded by more than 3 million tons that of the year before, the output of 1917 fell short of that of 1916 by very nearly 8 million tons. So far, however, from this falling off in quantity being accompanied by a corresponding reduction in value, there was an increase in the total value of the coal raised of just about the same number of millions of pounds sterling. As a matter of fact, the average price of coal per ton at the pit was a little more than 1s. above that of 1916, which in its turn showed an advance of over 3s. on that of 1915. Including everything, some 6 million tons less coal left the country in 1917 than during the year before; and the 200 million tons remaining for home consumption was nearly equal to 4¾ tons per head of the population. This figure is based on the estimated civil population for the year. In the immediately preceding report, it was stated that the output (which was some 8 million tons greater) in 1916 was equal to just over 4¾ tons per head of the estimated civil, military, and naval population for the year. Added to the previous total, last year's output brings up the quantity of coal raised during the past forty-five years to the big amount of 8964 million tons, of which nearly one-quarter has been shipped abroad as exports and as bunker coal for steamers engaged in foreign trade.

PERSONAL.

The staff of the Herne Bay Gas and Electricity Company, Ltd., have presented Mr. JASPER COOK (whose appointment to the position of Assistant Engineer to the Bedford Gas Company has already been intimated) with a set of fish carvers in a case suitably inscribed. The presentation was made by Mr. D. H. Davies (the Manager), who referred to Mr. Cook's 23 years' connection with the Herne Bay Company, and wished him every happiness and success in his new sphere.

Mr. J. D. ASHWORTH has resigned his appointment as Engineer and General Manager of the Portsea Island Gas Light Company, and Mr. THOMAS CARMICHAEL has succeeded to the engineership. Mr. Ashworth has been twenty years with the Portsmouth Company, having gone there in 1898 from the Rochdale Road works at Manchester, where he was Chief Draughtsman and Engineer's Assistant. He had been for thirteen years at Manchester. In 1904 he was appointed (in addition to Engineer) General Manager of the Company. Three or four months ago Mr. Carmichael gave up the position of Superintendent at the Basford gas-works of the Nottingham Corporation to become Assistant Engineer to the Portsea Island Gas Company.

OBITUARY.

Mr. ERNEST L. ROBINSON, of Carleton Hall, Pontefract, whose tar-distilling works are at Knottingley, has just died at the age of 53 years. He held various public positions.

Nottingham has lost one of its oldest and most esteemed Corporation officials by the death, which occurred with tragic suddenness, of Mr. JOHN ELEY BRYAN, the City Accountant and Treasurer. Deceased, who was 67 years of age, was a brother of the late Colonel W. B. Bryan, who was Chief Engineer to the Metropolitan Water Board.

The death occurred at his residence, St. Helier's, Hermitage Gardens, Edinburgh, on the 27th inst., of Mr. JOHN H. BENNET, Managing Director of the firm of Alder & Mackay, Ltd., Gas-Meter Manufacturers, of Edinburgh. He was at business as usual up to the end of the previous week; and in the first days of the illness nothing serious was apprehended. He had received a chill, which, however, developed into pneumonia; and he passed away with startling suddenness on Friday. Mr. Bennet was the only son of the late Mr. Joseph Bennet, who became associated with Mr. Alex. Mackay in the early seventies as partners in the firm of Alder & Mackay; the works at that time being in the Sciennes, on the south side of the city. After finishing his education at George Watson's College, Edinburgh, he was trained as an architect in a well-known office in Edinburgh, afterwards going to London, where he remained until the year 1886, when he joined the business of Alder & Mackay, which was then increasing in importance. Shortly afterwards the firm had to seek new works; and all the plans and supervision of the erection of the buildings were carried out by Mr. Bennet. The works are of the most up-to-date kind, and are replete with modern machinery and plant. Mr. Bennet's business ability was widely recognized throughout the gas industry; and he was well known to all connected with the manufacture and sale of gas. His death will be mourned by a large circle of friends. He leaves a widow, three sons, and one daughter. Two of the sons hold Commissions in the army; one of them being at present in hospital suffering from wounds sustained on the Italian front. In the interests of the business, Mr. Bennet went twice round the world a few years ago, and made many friends among gas engineers in both Australia and New Zealand.

The "Twi" Light.—With a view to minimizing gas consumption, the "Twi" Light is being manufactured by Messrs. William E. Farrar, Ltd., of Livery Street, Birmingham. It consists of a miniature Bunsen burner with a special form of mantle. The latter, which in shape bears some resemblance to a tea-cosy, open at the sides, is suspended over the burner by means of a wire hook. It is stated that the gas consumed is rather less than 2 c.ft. per hour; and that the light produced is about 20 c.p. The "Twi" Light is suitable for halls, landings, bedrooms, &c.

NATIONAL GAS COUNCIL.

Minutes of the Executive Committee's Meeting, Dec. 15.

THIS meeting was held at the temporary offices, No. 39, Victoria Street. The matters under discussion included the following:

In connection with shortage of labour and demobilization difficulties, it was reported that the Council had appealed to the Controller-General of Demobilization and Reinstatement for the immediate release of retort-house men from H.M. Forces on extended leave for (say) three months, in order that they may return to work, and the gas undertakings thus be enabled to cope with the critical period of the winter. Other suggestions had also been put forward for the early release of engineer pupils and apprentices, in order that their training may be resumed, and that they may become qualified as soon as possible to fill the many positions in the industry requiring trained workers. Application for the immediate release of pivotal men in gas-works had also been made to the Government Department concerned.

Communications with the Coal Mines Department of the Board of Trade regarding priority in coal supply to gas-works were reported. The Department had indicated that the coal situation at gas-works was being closely watched, and that everything possible would be done to meet requirements, although during the next few weeks the coal position would be extremely critical. In order that the situation at gas-works might be relieved, the price of gas oil had been reduced to 8½d. per gallon, so as to enable undertakings possessing carburetted water-gas plant to utilize it to the fullest extent.

Statistics obtained of available stocks of spent oxide throughout the kingdom were submitted; and it was arranged for these to be placed before the War Cabinet Industrial Transition Sub-Committee. Mr. J. W. Napier, the Secretary to the Scottish Gas Council, had been asked to represent Scottish gas undertakings; and a technical representative would be appointed to put forward the case for the other parts of the kingdom.

An interview between the Controller of Coal Mines and a deputation from Lancashire and Cheshire gas undertakings, accompanied by representatives of the Council, which took place on the 29th of November, for discussion of the Gas-Coke Prices Order, 1918, was reported. The deputation had been introduced by Alderman F. S. Phillips, who urged that the Order was now unnecessary; but that if the Controller felt that an Order must be issued, it should deal with nothing but the limitation of prices. The Controller promised to make several amendments, and to consider the whole position.

A letter from the Society of British Gas Industries, referring to the standard guarantee clauses for gas-meters, was submitted and referred to the Life of Gas-Meters Committee of the Institution of Gas Engineers.

A letter was read from the Ministry of Munitions, expressing the opinion that the considerations put forward by the Council—*e.g.*, the increased costs of materials and labour borne by gas undertakings producing crude ammoniacal liquor—constitute a reasonable basis for negotiation between such undertakings and contractors for the purchase of liquor; and it was decided to communicate the contents of the letter to the District Institutions and Associations of Gas Engineers who had raised with the Council the question of price.

The position of the gas industry relative to finance was further discussed; and it was decided to prepare immediately a case for consideration by the Council.

The Federation of British Industries having offered to supply the Council with copies of Mr. S. Turner's book, "From War to Work," it was decided to distribute these throughout the industry.

Lignite in Gas-Producers.—It is stated by "De Ingenieur" that a firm of glass manufacturers in Maassluis (Holland) have recently redesigned their gas-producers and furnaces to use lignite slack instead of coal. The quantity of coal used was 51 tons per diem, the corresponding quantity of lignite, with 40 p.ct. of moisture, is 180 tons, and with 30 p.ct. moisture 140 tons. The best results from the use of lignite instead of coal have been obtained with Jahn's gas-producer, which is divided into four or more chambers working in series; the fuel being bright red in the first, dull red in the second, just commencing to burn in the third, and filled through the fourth. A blower sends air through the third chamber containing fuel just commencing to burn, carrying the products of combustion into the second chamber, and, finally, through the first, which is in full glow. As difficulty arose through the available fuel containing rather more than 30 p.ct. of water, it was proposed to utilize the waste heat from the producer for drying the lignite, in order to reduce the moisture to 20 p.ct. It was, however, soon found that satisfactory results could not be obtained, owing to the poor quality of the lignite and the high percentage of moisture. After a number of experiments, it was seen that the only satisfactory way to dry the lignite slack was to reduce it to a fine powder by disintegration, and expose it to the hot gases while being slowly turned over. The moisture can in this way be reduced from 40 to 15 p.ct.; but powdered lignite cannot be gasified, and has to be compressed into briquettes for burning.

ELECTRICITY SUPPLY MEMORANDA.

THE Incorporated Municipal Electrical Association are having a bad time over their report on the national electricity scheme. They were self-appointed critics and counsellors. They are now being criticized and condemned. In one respect the principal papers of the electricity industry are unanimous in censuring the Council of the Association. As soon as District Boards, under the Electricity Commissioners, were mooted, some of the municipalities began to be busy trying to ostracize the important companies who have taken such large part in the development of electricity supply, and declaring they should have no representation on the Boards. The Association have adopted a similar attitude. The companies, in their opinion, are pariahs in the electrical land, and ought to have no part or voice in the management of the projected mammoth generating stations, from which they ought to be thankful that they are to be allowed to take current for distribution and sale. Justice does not even have a peep in here. The District Boards, municipal preference urges, should be composed of members of electricity supply local authorities and large consumers. What will the distributors of the current—company or municipal—be but "large consumers?" The suggestion is a remarkable one—so remarkable that we should prefer not to trust the authors of it with the administration of the stations in question. Apart from the want of justice, there is a certain amount of conceit about the suggestion; and conceited persons in business are a positive drawback, and should be avoided. Company administration has more reality and certainty about it than municipal management. The members of the boards of directors are shareholders; and they are elected from and by the body of shareholders, who have invested large sums of money in their concerns. On the other hand, members of the municipalities have not a penny-piece invested in the undertakings that they manage. These are the men who, according to municipal preference, are to become the chief managers (through the District Boards) of electricity generation; and the companies are all to compulsorily become patrons of the generating stations which they manage. "Ridiculous!" ought to be written across this part of the Association report in large characters and indelible ink. The "Electrical Review" speaks with gravity of the matter; the "Electrical Times" with a mixture of merriment and wisdom; while "Electrical Industries" also takes the municipal would-be controllers severely to task. Our second contemporary makes merry over the municipal aspiration, with the recollection tickling its mind of the number of municipal station engineers who have sought escape from the bondage of local authority service by attempting to secure appointments in company owned concerns. But after all, looking at the matter broadly, the best possible form of management would be that in which company and municipal administrators are blended—the one will help to keep the other straight, and see that the concerns are worked upon lines of financial rectitude. The history of electrical enterprise is fat with illustration of the success of local authority administrators in making deficits, and calling upon the ratepayers to meet them—among the largest of the victims being the gas companies. We are glad to see that the Bristol Corporation Electricity Committee, in dealing with the report of the Incorporated Municipal Electrical Association, have expressed the opinion that, where companies are now operating, and continue to operate as either generating or distributing authorities, they should not be excluded from representation on the District Boards. This gives a nice little flavour to the report, seeing the Hon. Secretary of the Association is Mr. H. Faraday Proctor, the Electrical Engineer at Bristol, and it was upon his recommendation that the resolution was passed of which the opinion is part. Members of municipalities who are investors in private enterprises will perhaps examine carefully the door which they are helping to open wide to communistic ideals.

The Outcasts.

A Greater London Scheme.

Still another statement on the Board of Trade Electric Power Committee's report. This time it is the Conference of Local Authorities Owning Electricity Undertakings in Greater London—a cumbrous title which, to a large extent, reflects the character of the report that has been prepared, and presented to anybody who likes to accept it. The Committee are not prepared without a protest to allow the report of the Board to "sit upon" the small electricity undertakings. They were pioneers, and much else. They only suffer from being among past errors; but they themselves are not to blame for having to occupy that *rôle*. It is questionable whether they can be truly described as "errors." Everything must have a beginning, from which evolution naturally proceeds. What is being proposed is but a part of this evolution. The error may have been committed of delaying the taking of the projected stage; and this stage looks like being buried in a mass of error, which may, if there be not a care to avoid it all, land the electricity industry in a financial mess which will have an effect contrary to that of allowing electrical energy to be distributed at a cheaper rate than before. The Conference want to see things electrical take a well-ordered course, and not a revolutionary one, though nasty things are said about company supply in London in comparison with municipal supply, with the minds of the drafters of the report a perfect blank as to the large amounts of rate-aid that their undertakings have had

in the past, and which neutralize their arguments in making the comparison. It is believed that interconnection would go a long way towards satisfying requirements if evolutionary methods were adopted to meet the cheapest possible supply, and the idea is endorsed that a comprehensive scheme for the generation of electricity on a reorganized basis should be established as soon as possible. Municipal authorities in London have already interconnected their systems, and have erected large generating stations rather than extend their existing stations. The Conference suggest that London should have a central authority all its own—the Greater London Electricity Board—to control the super-stations, on which Board all local authorities in the area should have representation. The County Council compulsory powers of purchase should be transferred to the Board, whose policy it would be to secure complete public control with the least expenditure of capital, without scrapping present economical stations.

Coal Conservation.

Among other points, the Conference dealt with coal conservation, advising that legislation should be set up to ensure the economical use of coal now and for all time by controlling its use both by private individuals and by public utility undertakings. It is thought that, if the individual were restricted in the use of fuel, the demand for electricity would be enormously increased. Therefore the producers of electricity should also be restricted in the use of fuel in order to obtain maximum economy. It is suggested, too, that existing steam-raising plant and buildings should be utilized as central heat supply stations; and in connection with the housing scheme of the Reconstruction Committee, it is considered that a supply of hot water is essential to public health. Judging by the health statistics under normal conditions, the public have not suffered much from the fact that electricity stations have not hitherto distributed hot water. We cannot afford to waste our coal reserves; but the Conference, like other reporters on electricity supply reformation, jump to conclusions. Here is one the foundations of which cannot be detected: "If a combined system of power, light, and heat distribution were adopted through the medium of electricity and water on the lines indicated, and restriction placed on the use of coal, the reserves of the country would last another 2000 years." The past history of electricity generation in this country does not offer any substantiation as to any probability of the fulfilment of this dream. Anyway those represented by the Conference will not be here to meet the rebuff of their miscalculation if the period happens to fall short of the 2000 years.

The Exodus of the Arcs.

Since the street-lamps of London have been unmasked, a noticeable feature has been the number of arc lamps that have been converted to low-power gas-filled—so-called "half-watt"—ones; and truly they are making a poor showing perched at the top of their high columns. It may be that, when there is release from the Coal Controller's decree that the street lighting is to be only 50 p.ct. of that of pre-war times, these lamps will be duplicated, or larger ones take their place. But at present they make poor substitutes for the arcs. Walking along the Strand, one gets a remarkable illustration of their illuminating weakness in contrast with the group of high-pressure gas-lamps at the approach to Waterloo Bridge. Between the gas-filled lamps at present doing duty and the high-pressure ones, there is a great difference in illumination level—as much difference as there is between cheerful sunlight and when the shades of evening begin to cast a touch of gloom over unlighted streets. In the cause of economy of labour and initial expense, many local authorities, as we have frequently seen reported, are scrapping arc lamps and adopting gas-filled incandescents. These lamps ask for no carbons and no "trimming." The lamps themselves only want renewing when the illuminating power noticeably depreciates. The change from the one system to the other, of course, necessitates fairly heavy capital expenditure. For instance, at Hackney 393 ten-ampere open-type white arc lamps and 11 seven-ampere flame arc lamps which were in use before the war are not to be reinstated, but in lieu thereof 404 "half-watt" 600 c.p. lamps are to be provided. The necessary alterations are estimated to cost £3026, which averages about £7 9s. 9d. per lamp. The arc lamps are of higher illuminating power; but part of the illumination is being sacrificed with the view of securing economy in cost and a steady and probably better diffused light.

Electric Cooker Tests and Excuses.

The "Electrical Times" had not space to devote to the report recently issued on the gas and electric cooker tests, in which Mr. Belling courageously stood up as the champion of electricity, and fell a victim to the outrage he had attempted upon fact through the medium of an advertisement. The "Electrical Times," however, devotes a column and more of space to palaver of great simplicity, running round about the matter, while keeping a respectful distance from the actual facts. The gas people are accused of knowing that the test was not fair to electricity, that it is not representative of what can be done with a standard electric-cooker, and that the British Commercial Gas Association refuse to take part in another test between gas and electric ovens. This is a gross misrepresentation of facts. Mr. Belling himself chose the cookers, and had part in agreeing to the conditions. As to further tests, we remember how in November our contemporary itself asked whether there were any makers of electric cookers that had proved their claims in actual practice who would be prepared to take up the cudgels on behalf of the electrical industry and challenge the gas interests to a test. That appeal has fallen flat. We have waited week by week for the makers to come forward; and they have remained silent. At the close of an article on the "Gas and Electric Cooker Tests," in our issue for Dec. 10, we quoted from a letter by Mr. W. M. Mason, published in the "Electrical Times," in the course of which it was stated:

> The Association would indeed welcome public and official tests that could not be ignored by the advocates of the use of electricity for fuel purposes. If the Institution of Electrical Engineers is prepared to take the question up, the Association will be glad to co-operate in drawing up such terms and conditions as would ensure a practical working demonstration of the relative costs, to the consumer in money and to the nation in coal, of carrying out all the culinary operations for a household (as performed by the kitchen range or the gas-cooker) first by electricity, second by gas.

What does this mean? Not that the Association will not take part in gas and electric oven tests, but that they will do so, *plus* the other culinary operations. The writer in our contemporary, by some peculiar twist of imagination, finds in this "the dragging of a red herring across the trail." He ought to know, if he does not, that, from the very nature of the different operations, the results of each would have to be dealt with and stated separately; so there could be no deception. But as the householder does not want to have two or three agents in his kitchen for heating purposes, it is the correct thing to show him not only the separate results, but the total, and their meaning.

Limitations of the Electric-Cooker.

Our contemporary now confesses that to heat water in any quantity from cold to boiling-point by electrical means under existing conditions cannot be justified on the question of cost. Some years since there was much talk of the all-electric house and the all-electric kitchen, and in no source of electrical information in louder tones than in the "Electrical Times." The electrical retirement from former ground is interesting, but not remarkable or surprising, as it was well-known that it would have to come. Then the writer goes on to present a bunch of claims for the electric-oven which, taken in the whole, have a wild extravagance about them that it is quite pitiful to see, and which tests such as those that the British Commercial Gas Association have participated in, and are prepared to engage in again, do not support as superior achievements of the electric-cooker. Even on the subject of cost, the writer at first only claims that cooking operations in an oven can be carried out by electrical means [at a low cost per unit] as economically as by gas [at lighting rates]; but our prudent friend says nothing whatever as to the coal expenditure in electrically developing the heat required by the oven, which is a point that is nationally of importance. But later he hesitatingly hedges with the remark that "no claim is made, under existing conditions, that the operating costs [we think he is referring to the hot-plate here] are lower than, or even as low as, those with gas. The claim has been made. The writer copies our friend Bastian by trotting-off to the electric-furnace for refuge; but he would not have been so imprudent as to ask the question he does if he had been fully informed on the subject. How do the gas people, he asks, account for the rapid development of the electric-furnace if running costs alone are the determining factor? Let us ask another question. How is it that gas-furnaces are being adopted at a rate which multiplies many times the number of electric-furnaces that are being installed? The answer to the first question is that the electric-furnace has a limited field in specific work where exceptionally high concentrated temperatures are required, and the cost does not count. But in the vastly greater number of operations where other conditions of working prevail, gas holds the field through cost and other merits. Cost, too, will always be the paramount consideration in the vast majority of our homes. But the sole question is: Taking cookers as made to-day, are the electrical people prepared to engage in the tests that the British Commercial Gas Association suggest? If not, why not? Altogether the electrical position in this connection seems to be a most unhappy one.

The Refractory Materials (Maximum Prices) Order.—The revocation, as from to-day, has been announced of the Refractory Materials (Maximum Prices) Order, which fixed a maximum price for firebricks, blast-furnace linings, ground fire-clay, and gas-retorts.

Metropolitan Gas Referees' Notification.—With the exception of two corrections, the Metropolitan Gas Referees have no alteration to make in their Notification for 1918, or in their Supplementary Notification dated August last. For the present, therefore, these Notifications will continue to be in force. The first of the two corrections is in the section dealing with the "Measurement of Gas," and consists of the addition of the words printed in italics in this sentence: "The meter used shall also be proved immediately whenever the gas measured by it shows a deficiency of illuminating or calorific power, *unless the meter has been proved earlier on the same day*." The second correction, which deals with testing, is the deletion of the three words in italics from: "The gas examiner shall enter in his book the particulars of every testing *of illuminating power* made by him," &c.

Sam! Cutler & Sons Ltd.

Engineers and Contractors

Complete plants for the production of

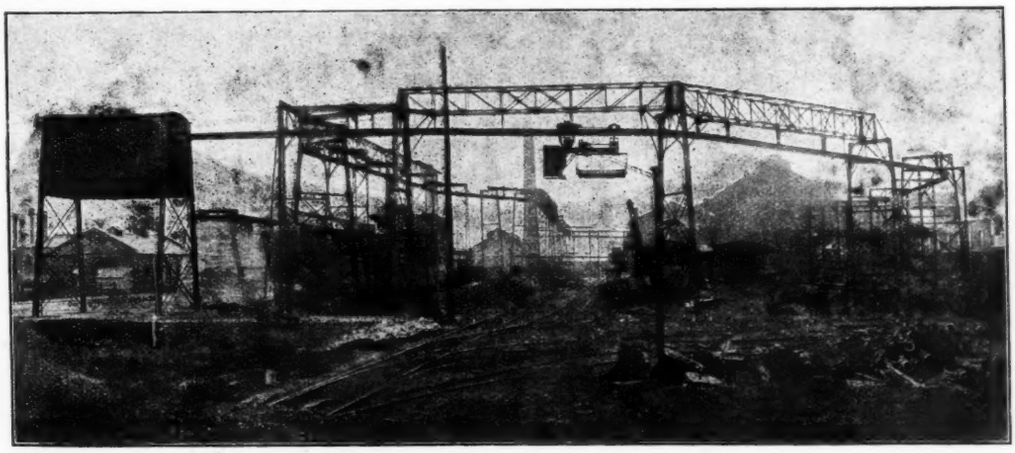
Coal Gas, Water Gas, Hydrogen Gas.

Poddiemore Iron Works, Millwall. **London.** 59, Victoria Street, Westminster.

FOR HIGH SPEED CONVEYING WITH

A MINIMUM OF LABOUR, POWER, & MAINTENANCE COST, USE

OUR MONO-RAIL TELPHER



In Use at:—

ALTRINCHAM, ABERDARE, AMSTERDAM, BECKTON, BIRMINGHAM, BLACKBURN, CARDIFF, DEVONPORT, DUNDEE, EXETER, GLASGOW, GREENOCK, HULL (GAS), HULL (ELECTRIC), KEIGHLEY, LEEDS, LEICESTER, LEA BRIDGE, LIVERPOOL, MANCHESTER (GAS), MANCHESTER (ELECTRIC), MERTHYR, MILL HILL, NEWPORT, POPLAR, PLYMOUTH, SOUTHPORT, STALYBRIDGE, STEPNEY, STOURBRIDGE, ST. PANCRAS, SOUTHAMPTON, SOUTH SHIELDS, STRETFORD, WALLASEY, WARRINGTON, WEST HAM, WEST HARTLEPOOL, WOLVERHAMPTON, WIDNES, WOOLWICH ARSENAL, WOOLWICH ELECTRIC, VICKERS LTD. ETC. ETC. ETC.

STRACHAN & HENSHAW, Ltd., BRISTOL.

GASHOLDERS

MILBOURNE PATENT ROLLER CARRIAGES. AUTOMATIC LUBRICATION.

PURIFIERS

WITH

MILBOURNE PATENT DUPLEX VALVES, AUTOMATIC COVER FASTENERS, SAFETY DISCHARGE SHOOTS, RUBBER JOINTING. "MILBEL" PATENT PURIFIER GRIDS.

CONDENSERS, SCRUBBERS, AND GAS WORKS PLANT OF EVERY DESCRIPTION.

C. & W. WALKER, LTD., DONNINGTON, NEWPORT—SALOP.

LONDON OFFICE: 110, CANNON STREET, E.C.

Volker Mantles

Combine strength with durability, and embody all the essential features for good lighting. They are **BRITISH** made throughout with **BRITISH** material and by **BRITISH** labour, and always have been.

The Volker Lighting Corporation, Ltd.,
Garratt Lane,——————————LONDON, S.W. 18.

COAL STATISTICS FOR 1917.

Annual Home Office Report.

AT the end of last week there was published Part III. of the Annual Home Office Report on Mines and Quarries, giving statistics regarding output for the year 1917. As was the case a year ago, this part of the report has been considerably curtailed by the omission of various tables, and other information which used to find a place in it. The signature appended to it is that of Mr. W. Walker, Acting Chief Inspector of Mines.

In 1917, the output of coal was 248,499,240 tons, of a value at the mines and quarries of £207,786,894. When compared with 1916, these figures show a decrease in output of 7,876,126 tons, and an increase in value of £7,772,268; the actual totals for that year having been 256,375,366 tons, with a value of £200,014,626. In 1915, the output was 253,206,081 tons, and the value was £157,830,670; while in 1914 there was an output of 265,664,393 tons, value £132,596,853. The average price of coal at the pit was 16s. 8·68d. per ton in 1917, compared with 15s. 7·24d. in 1916. The price of coal per ton at the mines in the four preceding years was: In 1915, 12s. 5·6d.; 1914, 9s. 11·79d.; 1913, 10s. 1·52d.; and 1912, 9s. 0·68d.

The total decrease in output of 7,876,126 tons for last year as compared with 1916 is accounted for by fallings off to the following extent in the various fields. In the English fields, there was a decrease of 3,567,761 tons, in Wales of 2,465,291 tons, and in Scotland of 1,848,887 tons. As against these figures, there was an increase of 5813 tons in the case of Ireland. The respective outputs were: England, 176,186,270 tons, value £142,104,488; Wales, 37,971,580 tons, value £38,859,568; Scotland, 34,245,744 tons, value £26,735,674; Ireland, 95,646 tons, value £87,164. The total output of anthracite (which is included in the statistics relating to coal) for the period covered by the report was 3,799,440 tons, having a value of £3,749,688. There was in the preceding year an output of anthracite amounting to 4,644,045 tons, of a value of £4,159,953.

From a table showing the approximate price per ton of coal at the mines for each county in which it was raised, it is seen that in the case of England the price varied from 20s. 5·47d. in Monmouth to 12s. 0·95d. in the North Riding of York; the average being 16s. 1·51d. For Wales, the highest figures were 22s. 3·99d. (for anthracite) in Brecon and 20s. 11·1d. in Glamorgan, and the lowest 16s. 5·11d. for Flint; with an average of 20s. 5·61d. In the case of Scotland, Dumbarton heads the list with 18s. 8·6d., and Haddington is lowest with 13s. 9·81d.; the average being 15s. 7·37d. For Ireland, the figures ranged from 20s. 8d. in the case of Queen's County to 16s. 6·65d. for Leitrim; the average working out at 18s. 2·72d.

The quantity of coal exported in the year 1917 (exclusive of coke and manufactured fuel, and of coal shipped for the use of steamers engaged in foreign trade) was 34,995,787 tons, which compares with 38,351,553 tons in the preceding year, and 43,534,560 tons in 1915. Last year there was also, in addition to the quantity already named, the equivalent of 2,131,077 tons of coal exported in the form of 1,278,646 tons of coke, and 1,373,645 tons in the shape of 1,526,272 tons of manufactured fuel; while 10,227,952 tons were shipped for use by steamers engaged in foreign trade. In this way, the total quantity of coal which left the country was 48,728,461 tons, as compared with 55,001,113 tons in 1916, and 59,951,925 tons in 1915. Of the coal exported as such, France received over 17½ million tons, Italy over 4 million tons, Malta nearly 1¾ million tons, Egypt over 1½ million tons, Gibraltar nearly 1¼ million tons, and Russia and Norway each over 1 million tons.

Out of the total quantity of 248,499,240 tons raised in 1917, the amount remaining for home consumption for all purposes was 199,770,779 tons, or 4·725 tons per head of the population of the United Kingdom (based on the estimated civil population for that year). These figures compare with 201,374,253 tons, and 4·525 tons per head of the population for the previous year. In 1915 the quantity which remained for home consumption (193,254,156 tons) was 4·193 tons per head. Of the total in the year under review, 40,981,757 tons were used in the manufacture of coke and briquettes, and 2,816,318 tons of coal with 10,961,734 tons of coke (equal to 18,269,557 tons of coal) in blast-furnaces for the manufacture of pig iron, as against 39,384,879 tons and 19,780,690 tons respectively in the previous year.

COKE STATISTICS.

Particulars relating to the production of coke and briquettes, and the number of coking-ovens in use during last year, are also contained in the report. Returns of production of coke were received from 128 colliery owners (comprising 169 separate works), 1460 gas companies, and 29 other owners of coke-ovens (comprising 31 works). The counties of Durham and York furnished 64 p.ct. of the total quantity of coke made at coke-ovens. Of the 200 works (other than gas-works) where coking plant was in use, bye-products (principally sulphate of ammonia and tar) were recovered at 123. The number was 115 in 1916, and 116 in 1915.

The total quantity of coal used in the manufacture of coke in 1917 is put at 39,300,504 tons; the amount of coke obtained being 21,995,125 tons—8,440,074 tons from gas-works, and 13,555,051 tons from coke-ovens—of a total value of £30,680,447. For the previous year there was an output of 21,389,363 tons of coke—8,100,889 tons from gas-works, and 13,288,474 tons from coke-ovens—of a total value of £26,725,482. Of the output from gas-works during last year, 7,250,843 tons came from England, 186,295 tons from Wales, 806,933 tons from Scotland, 188,704 tons from Ireland, and 7299 tons from the Isle of Man. There were 16,540 coke-ovens in use; and of these 7013 were of the beehive type, compared with 6892 in the preceding year. Of the remainder, the types most generally in use were: Otto-Hilgenstock, 2217; Simon-Carvès, 1756; Coppée, 1415; Koppers, 1361; and Semet-Solvay, 1357. There were 1,746,048 tons of briquettes produced, selling at the place of manufacture for £2,472,701.

OTHER MATERIALS.

There was a total output of iron ore during 1917 from mines in the United Kingdom of 8,013,947 tons, valued at £5,469,206, and from quarries 6,831,787 tons, valued at £960,414. Added to this there were 6,189,655 tons of ore imported; and, with the necessary adjustments, there was a total quantity of ore, &c., available for the furnaces of 22,901,714 tons. From this the quantity of pig iron made was 9,338,104 tons, the value of which would be, according to the average export value for the year, £86,192,279. Of this 4,688,063 tons, valued at £43,271,614, was pig iron from British ore.

The output of oil-shale last year was 3,117,658 tons. The average price per ton at the mines was 8s. 2·54d.; the total value being £1,280,007. The figures for 1916 were 3,009,232 tons, of a value of £1,032,294. The average yield of oil for Scotland per ton of shale is 20 gallons, and of sulphate of ammonia 40 lbs. per ton of shale. During the twelve months under review, 826,895,171 gallons of petroleum, valued at £33,886,972, were imported into the United Kingdom, or 375,339,019 gallons and £14,107,892 value more than in the preceding year.

SIXTY YEARS AGO.

[From the "Journal" for December, 1858.]

Gas Agitation in the Metropolis.—The delegates from the Metropolitan Vestries to the gas reform congress of Marylebone appointed a deputation from their body during the last parliamentary campaign to take charge of their case, and abandoned to them their delegated duties. These valorous deputies have now rushed into print. They have published a declaration of rights and wrongs, they have laid bare their plan for the ensuing campaign, and they appeal to the pockets of their fellow-citizens for support. A large portion of their long-winded blast of defiance to the gas companies of the Metropolis will be found in another part of the "JOURNAL;" and justice requires us to say that the blast is strong as well as long. Their courage, which had almost oozed out at their fingers' ends by the damaging evidence and cross-examination of the witnesses before the Parliamentary Committee, has come back to them during the recess; and they now look as valiant as the British lion rampant. The past, present, and future come within the scope of the report of the managers to the general body of delegates, which commences with the old story that the gas companies of the Metropolis were established on the principle of competition, and that this principle has been subverted by the districting arrangements. It then proceeds to notice the alarm of the gas consumer on being thus bound hand and foot, to be dealt with as the companies might think fit, to show the advantage that had been taken in one instance of their helpless condition, and to picture the dreadful state of oppression to which they might be subjected. The proceedings of the delegates, shorn of their bombastic eloquence and of most of their fallacious and absurd representations, are duly set forth; and the managers are bold enough to review, though very briefly, the proceedings before the Committee of the House of Commons.

The "Curfew" Order at an End.—Among the Orders which the "London Gazette" has notified as being revoked or suspended indefinitely is the "Curfew" Order which was designed to secure the saving of gas and electricity. It was first relaxed over the Christmas holidays, and then entirely put an end to. The Order, which came into force on April 2 last, prohibited the cooking of food or the serving of hot meals in any hotel, club, inn, restaurant, or boarding-house between 9.30 at night and 5 in the morning. It directed that all lights in the dining-rooms of these places must be put out at 10 o'clock at night, and forbade the continuance of performances in theatres, music-halls, cinema theatres, and other places of amusement after 10.30.

Utilization of Waste Products.—The Munitions Inventions Department of the Ministry of Munitions have instituted inquiries with the object of ascertaining whether waste products of various chemical manufactures can be utilized for industrial purposes; and the Waste Products Committee of the Department have carried out experiments on a number of these waste products—including residues suitable for the purification of coal gas from sulphuretted hydrogen, and sulphide of arsenic residues from the purification of sulphuric acid. Particulars as to the results of their experiments will be furnished to chemical manufacturers interested, upon application being made to the Controller of Munitions Inventions, No. 10, Princes Street, Westminster, S.W.

GAS-FURNACES AT MANCHESTER EXHIBITION.

The Gas Appliances Section of the British Scientific Products Exhibition at Manchester, though not very extensive, is one of the few sections that were practically complete on Friday—the opening day.

Messrs. Brayshaw Furnaces and Tools, Ltd., of Hulme, Manchester, have three principal exhibits. The first is a twin-chambered "Lopress" furnace, heated by coal gas, producer gas, or oil, for hardening high-speed steel. Another exhibit is a special gas-fired furnace for testing refractory materials, readily capable of attaining a temperature of 1650° C. A number of refractories —fire-bricks, cones, &c.—some of which had been treated in this furnace at a temperature of 1800° C., are displayed in an adjoining case. The remaining exhibit of the Brayshaw Company is a gas-fired forging furnace for treating bars, nuts, bolts, &c. The Davis Furnace Company, of Luton, are also showing a forging furnace for the testing and rapid heating of material to forging temperature. Other exhibits of the same firm are a laboratory crucible furnace for melting small quantities (not exceeding 10 lbs.) of the precious metals; a portable, self-contained, gas-fired tool-room outfit; and a small twin-chambered furnace for the heat treatment of high-speed steels. The Richmond Gas Stove and Meter Company, Ltd., of Warrington, are showing a new type of high-speed steel hardening furnace, in which temperatures of 1450° C. can easily be reached; the usual working temperature being between 1200° and 1350° C. In addition to a salt or lead bath furnace, the Richmond Company are exhibitors of a gas and air blast furnace—the "glory hole"—for re-heating and finishing glassware; the working temperature being about 1500° C. A selection of "Richmond" high-power burners, and examples of enamelling work on sheet and cast iron, as used in the manufacture of gas-stoves, also find part of the firm's exhibits. The Monometer Manufacturing Company, Ltd., of Aston, Birmingham, intend to display in another part of the building types of oven and muffle furnaces and other plant. Up to the time of the opening, however, the exhibits were not available.

Messrs. Curtis's and Harveys, Ltd., of London, and the Ramie Company, Ltd., of Bredbury, both have interesting displays in show-cases of samples of monazite sand, thorium and cerium compounds, and incandescent mantles in various stages of manufacture. Bye-products of the gas industry have a prominent position in the exhibits of British Dyes, Ltd., of Huddersfield; Levinstein, Ltd., of Manchester; Brotherton and Co., Ltd., of Leeds; Solway Dyes, Ltd., of Carlisle; and J. W. Leitch and Co., of Huddersfield.

The refractories industry is represented by several firms, including the General Refractories Company, Ltd., of Sheffield, with samples of magnesite, silica, chrome, dolomite, fire-clay, bauxite, carbon, &c., bricks. Similar materials were shown by the Kelham Island Fire-Brick Company, Ltd., of Sheffield; the Yorkshire Refractories Company, Ltd., of Doncaster; and the Cleveland Magnesite and Refractory Company, of Eston.

Messrs. Sutcliffe, Speakman, and Co., Ltd., of Leigh, Lancs., makers of machinery for the manufacture of refractory materials &c., have an extremely interesting exhibit of patent fuel made by plant of their manufacture. The briquettes have a very highly-polished surface, and are clean to handle. The important feature of the process is that the addition of any binding material is unnecessary—the process depending primarily on the fine grinding of the raw material and the application of extremely high pressure.

COKE-OVEN MANAGERS' ASSOCIATION.

MIDLAND SECTION.

Discussion on the "Effects of Ammonia Recovery."

The following discussion took place at the meeting of the Association in Sheffield last Saturday week, after the reading by Mr. T. B. Smith, of Stockbridge, of his paper on the "Effects of Indirect and Direct Ammonia Recovery on the Other Bye-Products, and Some of the Advantages to be Made Use of." The paper itself was reproduced in the last issue of the "JOURNAL" [p. 661].

DISCUSSION.

Mr. T. A. LONG (Nunnery), in opening the discussion, asked Mr. Smith if he made any ammoniacal liquor on his plant; and, if so, by what method did he deal with it.

Mr. J. T. PRICE (Redbourne Hill) said that while he must admit that future developments probably lay in the direct process, he had yet to be convinced of the advantages of it over the indirect process. It had a long way to go before it put the indirect process aside. Mr. Smith had mentioned the advantages of the direct process, and referred to minimum steam consumption. He (Mr. Price) did not think it had been found that this was so low as the advocates of the direct process claimed it to be. The author spoke of the fact that liquor storage was not regarded as an advantage of the process; but he (Mr. Price) fancied that some of those who had this process would be only pleased if they had a little storage sometimes. As to the increased efficiency of ammonia recovery, that claim also was questionable. No mention was made of chloride liquor and its disposal. He thought Mr. Smith condemned himself, to some extent, in pointing out some of the disadvantages of the direct plant. He said the tar in cold weather was more like pitch than anything else, and went on to speak of the coloration of the sulphate of ammonia, which was a disadvantage from the commercial standpoint. In regard to the cooling plant, the author had said that the naphthalene troubles were exceptionally great. He (Mr. Price) a short time ago visited some plants in South Wales, previous to which he had held somewhat similar views to those of Mr. Smith; and he could now assure him that the advantages he claimed were not peculiar to the particular type of plant named in the paper. He hoped soon to have the opportunity of inviting the members to his own plant at Redbourne Hill, when he might be able to show them something of his methods of stripping the oil.

Mr. J. HAMER (Middleton) said the direct process on his plant had worked without any of the disadvantages or difficulties which Mr. Smith had mentioned in the paper. Mr. Price's objections to the direct process were very slight indeed. In regard to the tar, the author had said he got 40 to 50 gallons of oil per ton of tar—the tar being very thick. He (Mr. Hamer) had distilled about 50,000 tons of direct tar in the past five years, and the average of pitch had never exceeded 53 p.ct., though the tar certainly had been occasionally rather thick. The loss on distillation worked out at about ½ p.ct. At his place they charged dry tar to the tar plant, giving a yield of anything up to 47 or 48 p.ct. of tar oils all round. There could not possibly be more than 3 p.ct. of the constituents of normal tar which would pass the tar-extractors up to the cooling plant. With regard to naphthalene trouble, he had had the same trouble in the early days—the necessity for steaming-out the cooling plant; but by looking into the quality of the oil, he had never had need to steam-out the mains for five years past. This in itself did away with the disadvantages of which Mr. Price spoke. He (Mr. Hamer) could show a yield of 31½ lbs. of ammonia over five years; whereas before it had seldom exceeded 21 lbs., with a better quality of coal, by the indirect process. With regard to the coloration of the salt, he did not agree that it was entirely due to sulphocyanides. They could get it just the same with ordinary indirect salt. The conditions at present were such that one obtained CS_2, CO_2, water, and cyanide in layers. The greater number of the direct process plants were not making materially colored salt at all. His own salt was merely a pale cream, as good as the best that was ever turned out by the indirect process.

Mr. W. GREEN said Mr. Smith's paper had turned attention to many of the reactions which occurred during the extraction of bye-products. With regard to the effluent liquor, the author had mentioned a certain percentage of phenol. Was there any pyridene in this liquor? And how much of it was calculated in the ammonia result? Could Mr. Smith give any figures of the analysis of the ammonia liquor? On some direct plants the amount of equivalent liquor accounted for up to 25 p.ct. of the ammonia sulphate. Could Mr. Smith show the percentage of phenols and pyridene? With the direct plant, he (Mr. Green) would imagine that it lent itself to the extraction of phenols and pyridene, because these came forward in the gas where, in the indirect plant, they went into solution in the gas liquor. Dr. Colman had shown that the percentage of phenols found in the ammonia liquor was only slightly less than the percentage of phenols in the tar; and he (Mr. Green) thought the direct process lent itself to the extraction of these bodies. It certainly lent itself to the scientific ideal of the fractional condensation of the tar; and one foresaw that this should be the possibility of the future.

Mr. A. R. FLEMING (Silverwood) said he had not tested many samples of tar from the direct plants; but those he had tested had shown results approximating to those of Mr. Smith. In regard to the coloration of the sulphate of ammonia, he had found it in the indirect process; and, as far as he could discover, the root cause was slight contamination of the liquor going to the still with tarry matters. The coloration was only very slight. Another question which had arisen in his (Mr. Fleming's) mind was that of double ferrocyanide of iron and ammonia. What percentage of cyanogen in the gas was required to make this process commercially profitable?

Mr. GEO. CHRISP (Silverwood) said that while not agreeing with all the author had said, he did not altogether agree with the criticisms to which the paper had been subjected. Mr. Smith had been very open in his own criticism of the direct as well as of the indirect process. In view of the importance of neutral sulphate in the near future, he would ask the author if he thought the beautiful commercial process of Curphey's was not highly advantageous; and he (Mr. Chrisp) could not see that it was applicable to the direct process. Further, much of the discoloration found in the sulphate could be traced to the sulphuric acid. One matter which was largely responsible for the discoloration was metal selenium. If they used ore in which there had been a fairly high percentage of this, they had discolored salt, while the coloring was not there when there had been little selenium.

Mr. H. LAMB (Barnsley Main) said the question of naphthalene and wash-oil opened up a big subject; and he would be pleased if Mr. Smith could give any figures conveying more to their minds than half and half.

Mr. G. A. HEBDEN (Parkgate) said he had a direct process at work. He came across certain commercial handicaps. When one had the indirect plant, there was an opportunity to make other products which were not possible with the direct plant. They could go on to the market with ammonia, or they could use it for the new oxydization process, and they could make other things. Nitrate would certainly come on to the market; and if one had the stills and the ammoniacal liquor, one could make it. But it could not be done on the direct plant without altering the plant to such an extent that it would become indirect. From the commercial standpoint, the indirect plant was the better. With reference to good sulphate, he used to purify his gas before making sulphate. The gas was washed for pyridene, and then passed forward to the saturators; and he always got a white salt.

The CHAIRMAN said Mr. Smith had revealed some disadvantages of the two systems which they already knew of, and had opened up some which, to him at any rate, were new ones. Mr. Hamer had given figures which were very interesting. It was about the first time he had heard any really substantial figures given in discussion as to the comparative yields of ammonia from the indirect and direct processes.

Mr. Hamer had told them that in the days of the indirect plant he used to recover somewhere about 29 lbs. of ammonia, and now, with direct plant, he recovered 31½ lbs. If these figures could be substantiated by other works, that was a very great point in favour of the direct process. He must admit that his own preference was for the indirect process. There were some difficulties which Mr. Smith had not mentioned in regard to the direct process. There was, for instance, the problem of rock salt. Mr. Hebden had made a good point for the indirect process when he spoke of other products which could be put on the market by the indirect process.

Mr. SMITH, replying to the discussion, said Mr. Long had questioned the idea of being entirely without liquor. Perhaps he would question still further when he (Mr. Smith) said he had had to continuously add water to keep sufficient liquor for the dry sprays. He had, of course, a very dry coal. By the use of the coils and saturators and other instruments, a spray in the Simon-Carvès plant, with increased suction between the cyclone and the exhauster on to the saturators, he did not think much trouble would be met with. On his plant, it had not been necessary to make any liquor. The only times they had sent out liquor had been due to some trifling need of the moment. In regard to Mr. Price, he would say that he (Mr. Smith) was managing a direct plant now. He admitted being prejudiced in favour of this process, and thought the indirect process could not touch it. At the same time, he had intentionally written as unprejudiced a report of the two types as he could do from his experience of both types. He favoured the direct plant all through. But he mentioned the disadvantages, so that he could not be accused of prejudice in the paper; and, if anything, he had not given the direct as fair a show as the indirect in consequence of this endeavour. In regard to minimum steam consumption, in the direct plant the only steam required was indirect steam for the coils and saturator and steam to dry the air compressor. The latter could be equalized by the lime-mixing pump. As regarded increased efficiency, he got 99·8 p.ct. efficiency on his present plant, and he had obtained the same on an Otto plant in Durham. Mr. Hamer's figures as regarded sulphate of ammonia were exceptionally high, and were, he thought, due to the temperature of the ovens. He would like to know how they would compare with his benzol recovery. The figures he (Mr. Smith) had given for tar were from an Otto plant in Durham. At his present plant he got thick tar; but he would point out that it was an advantage. They took out the oil from the tar, and the oil served its purpose in washing the gas for benzol; and instead of losing 25 p.ct. of oil at the benzol plant, they gained somewhere about 1000 to 2000 gallons of oil every week, and it was only a question of putting it back where it belonged. With regard to the coloration of the salt, he had found traces of phenols, but not to any great extent. He suggested that if the coloration was due to phenolic bodies the salt would be a more violet colour. Pyridene did come out in the salt. The chloride liquor his plant made was almost negligible; but it varied from 2 to 3 p.ct., according to the evaporation taking place between the cyclone and the exhausters, due to increased suction. In regard to Mr. Chrisp's observations, he had found a considerable amount of selenium, but had not been in a position to say anything for or against it. The direct process would certainly be no use for the other products mentioned by Mr. Hebden; but on his own plant they had no market for these as yet. The Chairman had mentioned rock salt. He (Mr. Smith) had had no experience at all of this at either plant. He had never had a blockage in the saturator, and he had never heard of a modern type getting blocked.

The proceedings concluded with a vote of thanks to the author.

It was arranged to hold the January meeting of the Association at the Leeds University; the February meeting, at Sheffield; the March meeting, at Doncaster; the April gathering, at Barnsley.

TARS AND TAR OILS FOR DIESEL ENGINES.

The Diesel engine is fully dealt with (by means of 130 pages of matter, accompanied by over seventy illustrations) by Mr. Herbert Haas, in Bulletin No. 156 of the United States Bureau of Mines. With the details of construction of this particular type of engine, it is unnecessary to deal here. Its high commercial value is based upon its fuel economy and ability to burn low-priced liquid fuels with high boiling-points. The liquid fuels suitable for Diesel engines are divided into three groups in the Bulletin—petroleum and lignite-tar oils; coal-tar oils, coal tars, and miscellaneous tars; and vegetable oils, which are glycerides of fatty acids. Fuels of the first group are, it is stated, particularly valuable for the purpose. The liquid fuels of the second group mentioned, composed chiefly of aromatic hydrocarbons, are low in hydrogen, are ignited with difficulty, and do not burn readily in Diesel engines. This characteristic may be explained by their "ring" structure, which holds the atoms together in a closed ring or in combined ring groups of great stability. The ring can be broken or split only by great heat. The oxygen cannot attack the inner ring of carbon atoms and break it, before the outer hydrocarbon radicals (relatively rich in hydrogen) have been ignited and burned, and have furnished the high heat required to burn the carbon atoms. The outer hydrocarbon radicals themselves are not readily ignited and split from the inner carbon atoms, as they hold these tenaciously. This behaviour is so pronounced that benzol, which has the simplest structure of the hydrocarbons (which can all be derived from the "benzol ring," and are also called benzol derivatives), cannot be burned in the Diesel engine, and resists combustion far more than the much heavier anthracene and creosote oils;

MAIN D. S. O. FIRES

FOR FUEL ECONOMY.

HYGIENIC AND EFFICIENT.

Made in 55 sizes with a pleasing variety of designs.

Component parts are interchangeable, with Burners reversible, throughout each series.

Special Prices. . . . . Write for latest List.

ORDER NOW WHILE MATERIAL IS AVAILABLE.

R. & A. MAIN, LTD.

WORKS: Gothic Works, EDMONTON, N. 18; Gothic Ironworks, FALKIRK; and Gothic Works, BIRMINGHAM.

SHOWROOMS and BRANCHES: 25, PRINCES STREET, OXFORD CIRCUS, W. 1; 82, Gordon Street, GLASGOW; 18, Severn Street, Deansgate, MANCHESTER; 97, Millfield, BELFAST; 333, Queen Street, MELBOURNE; and 12, Cunningham Lane, Pitt Street, SYDNEY, N.S.W.

whereas tar oils and tar rich in benzol homologues, like toluol and xylol, burn more readily.

Coal-tar oils as used at present for Diesel engines are mixtures of the coal-tar fractions, naphthalene oil, and anthracene oil. From the first, the naphthalene is mostly removed; and the tar oil should be as free as possible from anthracene and its homologues. Small engines that work with lower cylinder temperatures than those in large engines, and at higher speed, do not burn the tar oil as well as do large engines. Large engines operating continuously at full or nearly full load can burn tar oils successfully without the use of an ignition oil, except for starting. In Germany, tar oil is the principal fuel for Diesel engines.

As to coal tars, Mr. Haas says that, with few exceptions, only those recovered in the manufacture of coal gas in vertical retorts, and those recovered from the production of coke in bye-product coke-ovens are suitable for use in Diesel engines. There have, however, been cases in which the coal tar from inclined retorts has been used. Coal tars almost invariably contain mineral constituents introduced from the retort or coking chambers; and if these constituents are found to be of a silicious character, they are particularly destructive in their action on the cylinders and valves. The reason why tars resulting from the working of horizontal retorts are not suitable for Diesel engines is because they contain only a small proportion of light oil, and a relatively large proportion of heavy and anthracene oils, and more than one-half of the tar consists of pitch. Vertical-retort and chamber-oven tars, upon the other hand, are successfully used because they have a high hydrogen content, and therefore a higher heating value than the tars made in horizontal retorts. They are relatively high in light oils, with comparatively little pitch at temperatures higher than 350° C.; while the free-carbon content, the coke residue (averaging about 6 p.ct.), and the naphthalene content are the lowest of all the coal tars. Coke-oven tars, being debenzolized in the process of production, are thick, heavy liquids. They contain no light oil and little middle oil, but are relatively high in heavy and anthracene oils. They contain 50 to 65 p.ct. of pitch, and are therefore correspondingly high in free carbon and in coke residue. The properties of water-gas and oil-gas tars vary greatly. Those that are high in hydrogen content and low in free carbon make excellent fuel for Diesel engines; whereas those high in free carbon and naphthalene are unsuitable.

The fact is recorded that in many European cities sufficient coal tar is derived from local gas-works to supply the fuel requirements of the Diesel engines that provide the cities with light and power. In Switzerland particularly, all power plants operated by these engines (of which there are a large number) have been under war conditions, using gas-works coal tar or tar oils.

MEETING AFTER-WAR DEMANDS.

In considering the most suitable methods to be adopted by gas undertakings in the United States for the purpose of coping with "Peace Prosperity" business, Mr. F. G. Curfman, in the "Gas Record" (Chicago), points out the probability that pre-war prices of building materials will not be seen again for many years to come, and that therefore the gas man who postpones carrying out improvements in the hope that markets will drop is neglecting his own interests. On the contrary, no time should be lost in taking all necessary steps to develop the industrial fuel branch of the gas industry. To increase the use of gas commercially, he says, the cost of operation must be reduced; and this reduction must come by the use of labour-saving devices. Such equipment is most practical in coal-gas plants which are carbonizing in large quantities. The future successful installations will be the big units. In view of the inability of many undertakings to spend the money necessary for a new modern plant, it is felt that there will be a demand for gas-ovens which can be constructed on the same foundations as the former gas-benches, with slight alterations to the retort-house, and the addition of charging buggys, discharging machines, coal and coke handling equipment, &c. With such ovens, they will more than double the production of gas per man per day, and make a coke which will meet the competition of metallurgical coke. The economies of these ovens are many—especially in the fuel required for heating. Also there is a better tar produced; and all other results will be equal to, if not better than, those obtained in the most modern types of horizontal gas benches. Another field open to the gas manufacturer is the production of gas having a lower heating value than is acceptable to the average domestic consumer. Such a gas is in tremendous demand for industrial purposes; and if, remarks the author, the average gas company would develop a few of the large industrial concerns which are usually in every community possessing a gas plant, and go after the business, they could supply this want as well as their city consumers—even though it were necessary to run it as a separate department of their gas-works. The progressive gas plant of the future will cease to attempt to sell a high calorific value gas where gas of lower value would serve the purpose and is infinitely cheaper to distribute.

The Spalding Urban District Council have applied to the Local Government Board for a Calorific Standard Order; the power proposed being 500 B.Th.U.

USE Simmance's

DEAD BEAT INDICATORS

instead of WATER-TUBE GAUGES and

"READ THE PRESSURE BY THE POINTER."

No liquid to evaporate and no levels to adjust.

No glasses to break and nothing to clean.

Direct reading, Open scale, Any range (Pressure, Vacuum, or Combination).

Incorrodible, Accurate, for foul or purified gas.

MADE IN MANY RANGES WITH TABLETS LETTERED AS DESIRED.

ALEXANDER WRIGHT & CO., LTD., WESTMINSTER.

Agents: Australia—FYVIE & STEWART, 360, Collins St., Melbourne; Canada—W. P. ROPER, 502, Merchants' Bank Building, Montreal.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Temporary Increase of Charges Act.

SIR,—Since this Act was passed last year there has been given an all-round increase of wages to practically all gas-works employees, from stokers down to labourers, of 5s. per six days *plus* the 12½ p.ct.; and a further demand is now made for a similar advance to bring gas-workers into line with engineers, &c. In fact, this advance has already been conceded by some corporations and companies, notwithstanding the settlement arrived at in October by the National Gas Council and the employees' representatives, and which was to hold good till Feb. 1 next. Such action on the part of some employers does not give much encouragement to the National Gas Council or its proposed District Boards of Employers for the settlement of such questions, either nationally or by districts.

However, this is not my point, which is, seeing that as no doubt this additional advance of wages will be granted all round, and thus make in all an advance of 10s. *plus* 12½ p.ct. per six days for wages alone, has the time not now come for the National Gas Council to approach the (new) Government for some further amelioration of the financial position of gas companies (corporations have already had special consideration), and especially sliding-scale companies, who have undoubtedly been very hard hit during the past four years, while loyally doing their duty to the State and also to consumers, while from the latter they have had very little consideration.

Can any of your readers or correspondents say if there is in contemplation any such movement as I have indicated, or if there would be any chance of a private Order for altering the sliding-scale standard price getting parliamentary consideration now, so long as the above Act remains in force?

It seems to be a certainty, either that the present standard prices be revised or that many gas companies will have a hard struggle for bare existence, and that the raising of money for extension of, or erecting new, plant, &c., will be practically impossible.

Could not the British Commercial Gas Association, through the Press, explain clearly the operation of the sliding-scale, as very few people (including Members of Parliament) have any understanding of this?

E. L. L.

Dec. 24, 1918.

Increase in Price at Kingston-on-Thames.—The Kingston-on-Thames Gas Company have notified their customers that, on account of increased cost of production, they have decided to raise the price of gas after the Christmas quarter from 3s. 9d. to 4s. per 1000 c.ft.

MISCELLANEOUS NEWS.

BUENOS AYRES GAS SCANDAL.

Under the above heading, "The Times" on Christmas Eve reproduced the following cable from their Buenos Ayres correspondent, dated Dec. 21:

The latest retort of the Municipality in the old-standing dispute with the Primitiva Gas Company, really demands a protest.

Stripped of all legal quibbles, the question comes down to one between debtor and creditor. The Municipality, while persistently refusing its sanction to the increase of rates to meet the scarcity of fuel, continues not to meet large liabilities due to the Company, although it decreases the liabilities by inflicting fines, the legality of which is open to argument.

When the Company suggest that it is impossible to continue to keep up the standard quality of gas in the face of fuel difficulties, the existing rates, and the Municipality's failure to meet its obligations, the latter retorts this afternoon with a decree which practically cancels the Primitiva Company's concession and distrains the property of its own creditor.

Minor questions may enter into the affair; but these are the broad lines of the situation, which certainly does not reflect great credit upon the Municipality.

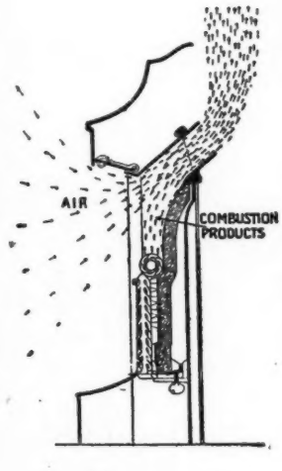
HEYWOOD GAS DEPARTMENT REPORT.

Reporting to the Heywood Corporation Gas Committee on the working for the twelve months ended March 31, Mr. W. Whatmough (the Engineer and Manager) says the gross revenue amounted to £27,971, and the gross expenditure (less interest and sinking fund) to £22,388, leaving a gross profit of £5583, or an increase of £96 when compared with the previous year. There was paid over for interest and sinking fund £5964, leaving a net loss of £381.

The receipts for gas sold for all purposes amounted to £20,438, compared with £19,686, or an increase of £752. The total increased receipts for residual products were £573. Expenditure on the manufacture of gas was again very heavy; being £15,150, against £14,242, or an increase of £908. The retrospective advance of 2s. 6d. per ton imposed by the Coal Controller on Sept. 17 of last year was the principal cause; but the amount would have been considerably more had not the working resulted in a saving of 820 tons of coal for the year. Labour and materials also show a considerable increase.

During the year 10,505 tons of coal were carbonized, as against

VENTILATION
• AND RADIANT HEAT. •



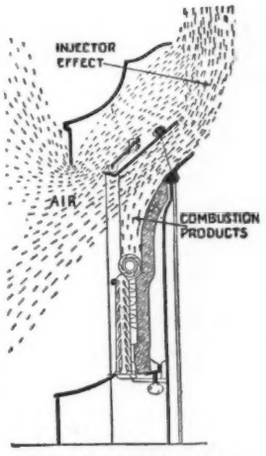
VENTILATION-REGULATOR
CLOSED.

Why are Wright's "Thermo-X" Gas-Fires so consistently popular Year after Year? Why do Doctors always approve and Architects so regularly recommend them? One of many reasons is that while the Fires give a radiant, healthy warmth to the room the patent "Injector - Ventilator" ensures the absolute purity of the atmosphere.

The diagrams here given will explain this outstanding advantage of the Wright Gas-Fires. It is a feature exclusive to these Fires. The air of the room is changed several times each hour, and is therefore always fresh and agreeable.

YOUR ENQUIRIES WILL BE APPRECIATED BY

JOHN WRIGHT & CO.,
Essex Works, Aston,
• BIRMINGHAM. •



VENTILATION-REGULATOR
OPEN.
Showing the great additional ventilation effected by the "Injector-Ventilator."

11,110 tons for 1917, or a decrease of 605 tons. The gas made per ton of coal was 13,256 c.ft., as against 12,297 c.ft. for the previous year, or an increase of 959 c.ft. The total quantity of gas manufactured was 139,260,000 c.ft., or an increase of 2,634,000 c.ft.; and the quantity sold as registered by consumers' meters was 124,603,000 c.ft., or an increase of 810,000 c.ft. Unaccounted-for gas shows an increase of 1 p.ct., being 8·71 p.ct., as against 7·70 p.ct.; but there is a probability of this being reduced during the coming year, as the gas unaccounted for during the quarter ended March 31 was normal—5·22 p.ct., compared with 7·92 p.ct. for the corresponding period last year, or a decrease of 2·7 p.ct. Owing to the Daylight Saving Act and the Defence of the Realm Act, the total decrease in gas sold, compared with pre-war, amounted to 12,313,000 c.ft. Ordinary consumption during the same period shows the large decrease of 20,017,000 c.ft.; while stoves and motive power have increased 7,704,000 c.ft.

Owing to the increased cost of coal, labour, and materials, the Committee were compelled to further raise the price of gas from Jan. 1 last by 7d. per 1000 c.ft. for prepayment meters, and 4d. per 1000 c.ft. for all other purposes. The charge for prepayment meters had only been advanced previously 2d. per 1000 c.ft.; so that the total advance is now 9d., as against 10d. for all other purposes, or an average of 9¼d. for all sales. The average increased price received for gas sold for the last financial year was only 6¼d. per 1000 c.ft., compared with pre-war, and 1·64d., compared with the previous year. Considering the small increase in the price of gas and the abnormal increased charges, the Committee will, says Mr. Whatmough, no doubt regard as satisfactory the increased gross profit of £96, which is in a large measure due to the saving of coal in carbonization. The financial position of the undertaking has been discussed by the Committee; but as the adverse balance is only small, and the increased charges have only been in operation for one quarter, there is every indication that the present price of gas will be sufficient to meet all liabilities during the coming year, unless unforeseen charges should be imposed upon the department.

SHEFFIELD AND COKE-OVEN GAS.

In an article headed "More Gas for Sheffield—Belated Adoption of University Professor's Suggestion," the "Sheffield Daily Telegraph" last Saturday week said: "After nearly three years' persistent and patient advocacy, in the face of official apathy and interested opposition, Prof. W. G. Fearnsides, of Sheffield University, has the satisfaction of seeing the realization of a scheme urged by him for the utilization of waste gas at colliery coke-oven plants, in supplementing the admittedly short supply from the Sheffield Gas-Works. Repeatedly during the war local munition firms have complained of the inadequacy of the gas supply; while for domestic uses the supply available was at times almost non-existent. Yet all this time there was obtainable from a coke-oven plant immediately adjoining the eastern boundary of the city a supply of 1,500,000 c.ft. of gas per day. Arrangements have now been made whereby the Sheffield Gas Company take the surplus gas from the Tinsley Park Colliery Company's coke-ovens. This agreement came into operation a couple of weeks ago; and the quality of the gas supplied is stated to be quite satisfactory. This, however, is likely to prove but the beginning of very considerable developments in this direction. Already negotiations are in progress for the utilization by local authorities and other large consumers of the surplus gas from coke-oven plants; and eventually it is believed the whole of the South Yorkshire coalfield will supply from its coke-oven plants surplus gas for power, heat, or illumination. In view of these probable developments, it is of interest to recall the genesis of the Sheffield scheme. It cannot make any claim to originality."

The writer then refers to what [as "JOURNAL" readers are aware] has been done in this connection at Birmingham, Middlesbrough, and Leeds; and, reverting to Sheffield, he remarks: The Tinsley Park coke-ovens are within 50 yards of the Sheffield city boundary, and within a mile of the important east-end district of steel foundries and heavy engineering and munition works, which throughout the war were crying out for more and cheaper gas. Within eight miles of the Sheffield works area are eight other coking plants, from which very large supplies of surplus gas have been available. Despite this, the Sheffield Gas Company have persistently refused to take advantage of this supply, and have, by the exercise of their monopoly powers, prevented other consumers profiting by it, until at last the Ministry of Munitions compelled the Company to adopt a less reactionary policy. Prof. Fearnsides called attention to the possibilities of this neglected source of power in the course of a discussion at the meeting of the Midland Institute of Mining, Civil, and Mechanical Engineers in January, 1916. In less than a week the Board of Trade asked Prof. Fearnsides to report more fully on the subject. He instanced (as being nearest to Sheffield) the installation of the Tinsley Park Colliery, which was in a position to supply 1,500,000 c.ft. of gas per day to the city, or alternatively might transform this gas into power which it might produce continuously at the rate of 2500 H.P. per hour. The gas thus wasted could, he estimated, be supplied to the munition works at a price less than half that charged at the time by the Gas Company. The price charged by the Company has since been still further increased. Prof. Fearnsides pointed out that the utilization of the surplus gas could be quickly put into operation; and except for the cost of a gasholder and the pipe-line over open country, no costly installation would be required. It is only fair to add that some years previous Mr. J. H. W. Laverick (the Managing Director of the Tinsley Park Colliery Company) had laid before the Sheffield Gas Company a project for taking the surplus gas from the coke-ovens, whereby a saving of at least 100 tons of coal per day could have been effected. As has been stated, however, the agreement has only just been com-

SAWER & PURVES,

THE POSITIVE DRY

PREPAYMENT METER

MANCHESTER & NOTTINGHAM.

pleted; and Sheffield is thus enabled to fall into line with more progressive pioneers in the utilization of coke-oven gas. In the light of his later investigations and fuller experience in the commercial use of coke-oven gas, Prof. Fearnsides is now of opinion that the ideal use of coke-oven gas is not so much in gas-engines for power purposes, as for illuminating and heating. "The proper thing to do with coke-oven gas, where you are in or near great centres of population," he said, "is to pipe it into the town mains."

Making a few calculations, the writer of the article in question says the Tinsley Park Colliery are now probably carbonizing something like 2500 tons of coal per week, and adds that, on his basis, a saving of nearly 1000 tons of coal per week could be effected by the full utilization of the surplus gas from this bench of coke-ovens alone. That is not only an appreciable item in the matter of coal supply, but represents a very considerable relief for the railways, which are already terribly congested in this district

SUBMARINE MAIN IN SAN FRANCISCO BAY.

Reference has already been made in the "JOURNAL" to the large gas supply requirements of the Bethlehem Shipbuilding Corporation's Alameda plant, in San Francisco Bay, and the consequent necessity for the Pacific Gas and Electric Company laying a special main from the gas-works on the Oakland side of the estuary to the yard on the other side. Gas as a fuel is to be used exclusively for rivet-heating in the boiler-shop, the plate-shop, and on the shipways, for pipe-bending, annealing plates, bending plates, in the copper-shop, for annealing boiler-tubes, in the galvanizing plant, for pre-heating torches, core-ovens, in the brass foundry, and for many other purposes. Details of the work of laying the main have now been published in the "Pacific Service Magazine," by Mr. W. M. Henderson, the Superintendent of Gas Distribution to the Pacific Gas and Electric Company.

Alameda is on an island; and the only available means of supplying it with gas was a submarine pipe across the navigable Oakland estuary. The channel is kept clear by the United States Government; and the final plans stipulated for a minimum depth of 40 ft., and required the removal of all excavated mud and earth to some suitable dumping ground. The crossing is 1300 ft. A line of 8-in. pipe was decided upon, welded, and painted with an asphalt preparation, and coated with a special covering. The pipe was welded together in two lengths of about 700 ft. each, which were then tested and wrapped. The pipe was capped at the end that entered the water, as it was desired to float it across the channel. When all was in readiness, a line was made fast to the pipe, and carried to a tug that was standing by; while on shore a team of horses was hitched to the pipe to help it along. The pipe was floated out with ease; and when the first length of 700 ft. had been run into the water, a halt was made, to enable the second section to be welded on to the first. This was rapidly done; and the pipe again started on its way. When about 900 ft. out from the Oakland shore, water was allowed to enter the pipe, which sank as it filled. All this time, the tug and horses continued to move the pipe; but when it had reached within 200 ft. of the Alameda side, it was found necessary to run a line ashore, and through a snatch-block, back to a pile-driver, which then relieved the tug and took up the burden. The pull, however, was tremendous; a 1¼-in. hemp rope parting when the pipe-line was within 100 ft. of its destination. So long as the pipe had been kept moving, it went along well; but when progress stopped to change the line to the pile-driver, it was with difficulty that a start was again made. Nevertheless, by persistent effort and patience, the pipe was at last run well up on the beach at the shipbuilding yard.

But the work proved to be by no means finished. On the Oakland side, a wharf had prevented the dredge from excavating the full-depth trench right up to the shore-line. The depth of the water was about 6 ft. beneath the wharf; but there was a drop to 30 ft. in front of it. This left a shelf that the pipe lay off from, so that it did not meet the trench bottom for about 150 ft. from shore. When it was seen that the pipe at this end was not so secure as had been expected, it was decided to at once raise the line, cut it, and place elbows in it, so as to bring it to the wharf in the bottom of the dredged trench, and then up and under the wharf to the line on shore. With some difficulty, 28 ft. of pipe extension, with an elbow at each end, was accordingly fitted; and by this time the valves had been installed, and all was ready for the test, which revealed a break in the line about 150 ft. from the Oakland shore. When a diver went down, he found a length of 60 ft. broken out of the line—doubtless through having been struck by a ship. The piece was brought ashore; and the ends, which had been crushed, were cut off, and a sufficient length of pipe welded on to replace them. The other portions of the pipe being previously secured between pontoons, in such a manner that they could be raised and lowered at will, the repaired part was welded on to the remainder of the pipe. The fact that the pipe had to be lifted over 40 ft. to clear the surface of the water made it necessary to take every precaution that it should not kink; and altogether the job of welding proved very difficult. Trouble was also experienced in attaching the necessary weights to the pipe.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Dec.* 30.

There is nothing of particular interest to record in the tar products market in view of the holidays during the past week. Pitch continues firm at the price last recorded, and shipments are being made satisfactorily. Dealings in crude benzol, crude naphtha, light oils, solvent naphtha, and heavy naphtha, also in coal tar and water-gas tar, can

"PIONEERS" OF BLUE WATER GAS
FOR "JOINT USE" WITH COAL GAS.
DEMPSTER'S COMBINATION OF
C-W-G- AND
BLUE WATER GAS
APPARATUS "IS NECESSARY."
R. & J. DEMPSTER, LTD.,
MANCHESTER.
Temporary London Office:
BLENHEIM MANSIONS,
BROADWAY, WESTMINSTER, S.W.1.
London Office Telephone No. Vic. 7426.

now be conducted without a licence; these articles having been freed by the Ministry of Munitions under an order dated the 20th inst.

The position of sulphate of ammonia remains unchanged.

Tar Products in the Provinces.

Dec. 30.

The average values for gas-works products during the week were: Gas-works coal tar, 31s. to 36s. Pitch, East Coast, 44s. to 45s. per ton; West Coast—Manchester 35s. to 40s., Liverpool 35s. to 40s., Clyde 35s. to 40s. nominal. Benzol 90 p.ct., North, 1s. 10d. to 1s. 11d.; 50-90 p.ct., naked, North, 1s. 7d. to 1s. 8d. Toluol, naked, North, 2s. 3d. Coal tar crude naphtha in bulk, North, 7¾d. to 8¼d. Solvent Naphtha, naked, North, 2s. 10d. to 2s. 11d. Heavy naphtha, North, 2s. 11d. to 3s. Creosote, in bulk, North, 4¼d. to 4½d. Heavy oils, in bulk, North, 5d. Carbolic acid, 60 p.ct. East and West Coasts, 3s. 6d. naked, nominal. Naphthalene, £25 to £30; salts, £6 to £7, bags included. Anthracene, "A" quality, 4d. to 6d. per minimum 40 p.ct.; "B" quality, 1½d. to 2d.

FROM A MARKET CORRESPONDENT.

Tar Products.

Since my last report there is no change of any consequence to note in these products. Toluol is dearer by 1s. per gallon, and benzol is saleable, in fair quantities at 2s. per gallon. Attention is being officially drawn to the fact that large quantities of benzol are now available for use as motor fuel, and that ordinary motor-spirit licences can be used for the purchase of benzol as well as petrol. The Petrol Control Department is now prepared to issue special supplementary licences available for the purchase of benzol only; such licences authorizing the purchase of a quantity of benzol exceeding by 50 p.ct. the quantity that would have been allotted on an ordinary motor-spirit licence. The benzol position is consequently becoming much clearer; and having regard to its superior thermal value, good sales should be made at current prices from now onwards until larger supplies of American petrol reach this country. Producers, however, will still need to tread warily, in view of the continued efforts of petroleum interests to obtain some sort of control over the product. Pitch maintains a steady tone, both in London and throughout the Provinces; while tar values have taken an upward move. Solvent and heavy naphtha are without much alteration. Crude carbolic acid is steady; but crystals are a trifle easier. Naphthalenes, cresylic acid, creosote, anthracene, and aniline oil are without change.

The range of quotations is as follows:

Benzol: 90% London, 2s. per gallon; 50-90%, 2s. per gallon.

Carbolic Acid: 60% East and West Coast 3s. per gallon; crystals 40% 1s. 4d. per lb.

Crude Tar: London 39s. to 41s.; Midlands 33s. to 35s.; North 32s. to 34s. per ton *ex* works.

Pitch: London 65s. per ton f.o.b. works; East Coast, 38s. to 42s.; West Coast, 41s. 6d. to 43s. f.a.s.; Manchester, 41s. to 42s.; Clyde, 41s.; South Wales, 45s. to 46s. per ton.

Solvent Naphtha: London 3s. 9d. to 4s.; North and Midlands 3s. 3d. to 3s. 6d. per gallon.

Crude Naphtha: Naked 1s. 1d. per gallon.

Heavy Naphtha: London 3s. to 3s. 6d.; Provincial 3s. 3d.

Naphthalene: Refined £28 per ton nominal; salts 80s., bags included.

Toluol: Naked, 3s. 4½d. per gallon nominal.

Creosote: Nominal, London 4½d.; North 4d. to 4¼d. (Government price, 75s. per ton f.o.b.—equal to 4⅛d. per gallon); heavy oil, 4½d. per gallon in bulk.

Anthracene: "A" quality, 40-45%, 4½d. per unit; "B" quality, 1¾d. to 2¼d.

Cresylic Acid: 95%, 3s. per gallon; 97-99%, 3s. 3d. to 3s. 6d. per gallon, casks included, *ex* works London and f.o.b. other ports.

Grease Oils 18° Tw. (naked) £6 per ton f.o.r. makers' works.

Sulphate of Ammonia.

Interesting developments are pending into which it is hoped to enter in an early issue in the New Year. Meantime, trade continues the even tenour of its way.

Working Hours of Engineers.

It was decided at a conference in London on Christmas Eve between representatives of the Engineering and the National Employers' Federation and the Shipbuilding Employers' Federation, and representatives of the Amalgamated Society of Engineers and Unions affiliated to the Engineering and Shipbuilding Federation (in connection with the introduction of the 47-hour week on Jan. 1), that the following provisions shall have effect pending further discussion: (1) The day shift shall terminate at the present hour of stopping in each establishment, unless otherwise agreed between the firm and their men. (2) Where necessary, in order to make up 47 hours on account of a 12 o'clock Saturday, half-an-hour extra shall be worked on one evening of the week, unless otherwise arranged between the firm and their men on a 47 hours' basis. (3) The rate of men whose normal working week (58 hours) is in excess of the normal district week (54) shall be enhanced as if they worked the normal district week (54). (4) Time rate per hour to be increased for day-shift men according to the amount of reduction in hours. (5) Night-shift to be paid on the enhanced day rate. (6) Night-shift hours to remain as at present, pending re-adjustment. (7) Premium bonus earnings shall be calculated on enhanced day-shift rate. (8) No change shall be made in piecework prices or lieu rates. (9) The foregoing, being a temporary arrangement pending further discussion between the Federations and the Trade Unions, is without prejudice to either party in dealing with any of the points involved, whether noted herein or not.

THREE POINTS

of advantage from the many found in our Slot Meters are:

1st.—They are Fraud Proof, and cannot be tampered with through the Slot.

2nd.—The Slot is closed when the maximum number of Coins have been inserted.

3rd.—Our Price-Changing System is the Simplest, Quickest, and most Accurate yet devised.

ALL PARTS INTERCHANGEABLE.

Tens of Thousands in use, and adopted exclusively by many Gas Companies.

WILLEY & CO., LTD.,

Exeter, London, Manchester, Leicester.

Telegrams:
"WILLEY, EXETER."
"GASVILLADO, KINLAND, LONDON."
"METERS, LEICESTER."
"WILMETER, MANCHESTER."

Telephone Nos.:
182 EXETER.
234 DALSTON, LONDON.
4777 LEICESTER.
7419 CITY (MANCHESTER).

LONDON WORKS & OFFICES:
89-95, Hertford Road, Kingsland, N.
LEICESTER:
5, Oxendon Street.
MANCHESTER:
John Street, Booth Street West, S.W.

AGENTS FOR SCOTLAND:
D. M. NELSON & CO., 20, WEST CAMPBELL ST., GLASGOW

Double Fatality at St. John's Wood.—At a flat in Grove End Road, St. John's Wood, two women friends were found dead together in bed, with the taps of a gas-bracket and a small stove turned on. The Coroner remarked at the inquest that, though it seemed a mysterious affair, it was very difficult for two taps to be turned on by accident. The Jury's verdict was to the effect that they were found dead from carbon monoxide gas poisoning; but there was no evidence to show how the poisoning occurred.

Certified Undertakings and Women's Wages.—There has been submitted to the Special Wages Committee of the Glasgow Corporation an application from the Municipal Employees' Association, requesting that the order, dated Aug. 28 last, by the Ministry of Munitions, granting to all women eighteen years of age and over 58., and girls under that age 2s. 6d., per full ordinary week, be extended to various female workers in the gas and electricity departments. After consideration, and having heard the Conveners of the two departments, as well as Mr. Campbell, on behalf of the applicants, the Committee (1) agreed to recommend that the application be refused, in respect that the order is not applicable to certified undertakings; and (2) acquiesced in the matter being referred to arbitration for settlement.

Dundee Gas-Works and Oil Production.—Part of the plant at the Dundee Corporation Gas-Works has been in use for the production of oil for the Admiralty. Some days ago intimation was received by the Corporation that this work would cease on the 29th inst.; but subsequently the Town Clerk had a telegram asking whether the date could be postponed. The reply was that the Corporation would be willing to carry on, if the Government would give a guarantee to supply them with cannel coal, and fix a price for the oil. The whole matter is to be discussed at a meeting in London.

Fatal Accident at the Saltley Gas-Works.—A verdict of "Accidental death" was returned at Birmingham last week with regard to the death of James Reddy, whose duty included attention to the starting and oiling of two motors which drive the coal-conveyors at the Saltley Gas-Works of the Corporation. Last Tuesday week, after he had started the motors, his clothing was caught in the shafting, and he was killed almost instantly. It was admitted by Mr. C. C. Barber, the Engineer at the works, that the shafting at this point was not guarded. It should have been; but owing to an oversight it was not. The Coroner (Mr. Isaac Bradley) referred to the unguarded shafting; and Mr. Minshull (the Corporation Solicitor) undertook to draw the attention of the Gas Department to the matter.

STOCK MARKET REPORT.

BUSINESS done for cash last week on the Stock Exchange was limited to the Monday and the Tuesday; the rest of the week being a close holiday. It was, of course, very light and unimportant; but at any rate the general tone was firm on the whole. The 5 p.ct. War Loan was very steady, and finished off at a fractional advance. Consols were rather doubtful, and touched a shade under 59. But they rallied later, and the final mark was 59⅜. Indians were easy. Home Rails met with a demand, and were quite firm. Canadians and Argentines were not in request.

The Foreign Market offered no new points, and was very quiet. In the Miscellaneous group, Rubber and Oil were in fair case; Breweries maintained their popularity; and Textiles looked up.

Business in the Gas Market was just barely alive. Only half-a-dozen undertakings were noticed at all; and they contributed two or three bargains apiece. However, this inanition did not prejudicially affect prices where any transactions were effected; and the general tendency was quite good. The quotation of Aldershot preference rose 5, and that of South Metropolitan preference 2. The only adverse movement was a fall of ¼ in Primitiva preference. This appears to have been the effect of a telegraphic despatch from Buenos Aires received by a contemporary and published on Monday, which throws a grave reflection upon the Municipality of the city. This body, which is deeply in debt to the Company, is stated to be constructing a set-off to its liabilities by inflicting fines, the legality of which is open to question. The Company having urged the impossibility of maintaining the standard quality of the gas in the face of coal difficulties, the low price of gas, and the Municipality's indebtedness, it is reported that the Municipality have rejoined by practically cancelling the Company's concession and attaching their property. If this be so, diplomatic action would seem to be called for.

Bargains done for cash during the week were as follows: On Monday, European 13¾, Gas Light maximum 56⅝, Imperial Continental 120, 121, 121½, Primitiva preference 72s. 6d., South Metropolitan 77¼. On Tuesday, Continental Union preference 74, European 13¾, Gas Light ordinary 73, 73¼, 73½, Imperial Continental 120⅝, Primitiva debenture 75⅝, 75½, South Metropolitan 76, 76¼. The London Stock Exchange was closed the rest of the week.

In the Money Market there was at first a fair demand; but this relaxed later. The Bank rate is 5 p.ct., as fixed on April 5, 1917.

The Stock Exchange has lately been considering the question of "bargains done for cash." It is now just four years since the Treasury imposed certain restrictions upon business, the main object of which was to safeguard the market against forced realizations and to close it entirely to the enemy. Business was to be on a cash basis only, and time bargains and options were forbidden. It is suggested that the time has arrived for reconsideration of these restrictions.

Mr. H. R. Crow, late of the Old Silkstone Colliery Company, has joined the firm of G. J. Eveson Coal and Coke Company, Ltd., and is taking up his duties on Jan. 1 with an office in Leeds.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue. £	Share.	When Div.	Ante-War Dividend & Bonus p.c.	Last Dividend.	NAME.	Closing Prices. July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
189,049	Stk.	Mar. 10	4	4%	Aldershot 4 p.c. Pref.	..	60—65	..
1,551,868	,,	April 8	2½	4⅜	Alliance & Dublin Ord.	59—64	51—56	..
874,000	,,	July 10	4	4%	Do. 4 p.c. Deb.	76—79	62—67	..
280,000	5	April 22	7½	8%	Bombay, Ltd.	5⅞—6⅜	5½—6	..
50,000	10	Feb. 26	16	11%	Bournemouth Gas and Water — 10 p.c.	29—30	22—24	..
388,110	10	,,	7	7%	Bournemouth Gas and Water — B 7 p.c.	15—15½	10½—11½	..
115,000	10	,,	6	6/-	Bournemouth Gas and Water — Pref. 6 p.c.	13½—14	9½—9¾	..
159,740	—	—	—	4%	Bournemouth Gas and Water — 4 p.c. Deb.	..	66—68	..
992,045	Stk.	Feb. 26	14	14%	Brentford A Consolid.	261—266	78—81	..
784,920	,,	,,	11	11%	Do. B New	204—209	70—73	..
55,000	,,	,,	5	5%	Do. 5 p.c. Pref.	109—111	77—82	..
221,400	,,	June 11	4	4%	Do. 4 p.c. Deb.	91—98	62—64*	..
217,380	,,	Feb. 26	11	8½%	Brighton & Hove Orig.	208—213	140—145	..
244,200	,,	,,	8	5½%	Do. A Ord. Stk.	154—159	97—102	..
580,000	20	Mar. 26	12½	22/6	British	44—45	31½—32½	..
120,000	Stk.	June 26	4	4%	Do. 4 p.c. Deb. Stk.	88—90	64—66	..
245,771	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	51—54	..
100,000	10	—	—	—	CapeTown & Dis., Ltd.	1½—2½	3⅜—4½	..
100,000	10	—	—	4½%	Do. 4½ p.c. Pref.	4—6	7½—8½	..
100,000	Stk.	June 26	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	60—65	..
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	79—81	..
1,518,280	,,	Feb. 12	5/9/4	36/-	Commercial 4 p.c. Stk.	106—108	62—67	..
560,000	,,	,,	5⅞	80/-	Do. 3½ p.c. do.	103—105	58—63	..
475,000	,,	June 11	3	3%	Do. 3 p.c. Deb. Stk.	69½—71½	51—53*	..
800,000	,,	,,	4	—	Continental Union Ltd.	76—79	50—55	..
200,000	,,	,,	7	—	Do. 7 p.c. Pref.	115—118	70—75	74
278,400	—	—	—	10½%	Croydon B and C 7 p.c.	..	135—140	..
—	—	—	—	10%	Do. E	..	..	..
492,270	Stk.	—	6	5½%	Derby Con. Stk.	123—125	95—100	..
55,000	,,	—	4	4%	Do. Deb. Stk.	102—104	80—83	..
1,002,180	10	July 29	10	5/0	European, Ltd.	17½—18	13—14	13½—18⅜
16,298,975	Stk.	Feb. 10	4/17/4	29/4	Gas Light and Coke — 4 p.c. Ord.	98—102	72—74	73—73½
2,600,000	,,	,,	3½	3½%	Gas Light and Coke — 3½ p.c. max.	76—79	55—57	56⅝
4,063,235	,,	,,	4	4%	Gas Light and Coke — 4 p.c. Con. Pref.	96—99	68—70	..
4,674,850	,,	June 11	3	3%	Gas Light and Coke — 3 p.c. Con. Deb.	72½—74½	55—57*	..
180,000	,,	,,	10	10%	Gas Light and Coke — 10 p.c. Bonds	..	..	..
258,740	,,	Mar. 12	5	22%	Hastings & St. L. 3½ p.c.	87—89	45—50	..
70,000	10	April 29	11	6%	Hongkong & China, Ltd.	16½—16¾	7⅞—8⅛	..
86,600	—	—	—	9½%	Hornsey 7 p.c.	..	117—122	..
131,000	Stk.	Mar. 12	7½	6½%	Ilford A and C.	151—154	92—97	..
65,780	,,	,,	6⅜	4⅜%	Do. B	115—118	70—75	..
65,500	,,	June 26	4	4%	Do. 4 p.c. Deb.	92—94	62—65	..
4,940,000	,,	May 14	9	4½%	Imperial Continental	150—160	150—125	120—121½
1,235,000	,,	Feb. 12	3½	3½%	Do. 3½ p.c. Deb. Red.	84—86	71—73	..
235,242	,,	Mar. 12	6½	6½%	Lea Bridge Ord. 5 p.c.	119—121	93—98	..
2,498,905	,,	Feb. 26	10	5%	Liverpool 5 p.c. Ord. A	211—218	82—84	..
					Liverpool 5 p.c. Ord. B	146—148		..
306,088	,,	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	..	71—73	..
75,000	5	June 11	6	3%	Malta & Mediterranean	4½—4¾	3½—3¾	..
250,000	100	April 1	4½	4½%	Met. of Melbourne 4½ p.c. Deb.	99—101	90—97	..
541,920	20	May 28	4	6/-	Monte Video, Ltd.	11½—12	9½—9¾	..
1,875,892	Stk.	July 29	4½	3½%	Newcastle&Gateh'd Con.	98½—99½	70—71	..
539,706	,,	June 26	3½	3½%	Do. 3½ p.c. Deb.	82—88	59—61	..
55,940	10	Feb. 26	7/14/0	7%	North Middlesex 7 p.c.	14—15	9½—10½	..
800,000	Stk.	May 14	8	8%	Oriental, Ltd.	117—122	103—105	..
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7½—7¾	4—5	..
60,000	50	Feb. 26	18	9%	Portsea, Island B	128—131	78—83	..
100,000	50	,,	12	6%	Do. C	118—121	73—78	..
53,000	50	,,	10	6%	Do. D	..	..	..
349,980	5	April 29	8	—	Primitiva Ord.	5⅜—6	2½—2⅝	..
499,960	5	June 26	5	2/6	Do. 5 p.c. Pref.	4½—5	2⅜—3⅛	72/6
621,600	100	June 2	4	4%	Do. 4 p.c. Deb.	91—98	74—76	75⅛—75½
—	—	—	—	4%	Do. ,, ,, 1911	..	52—57	..
846,198	Stk.	June 26	4	4%	River Plate 4 p.c. Deb.	85—87	55—60	..
150,000	10	May 14	6	6/	San Paulo 6 p.c. Pref.	10½—11	7⅛—8	..
125,000	50	July 1	5	5%	San Paulo 5 p.c. Deb.	47—49	40—42	..
185,000	Stk.	Mar. 12	10	10%	Sheffield A	228—234	170—173	..
209,984	,,	,,	10	10%	Do. B	222—224	170—173	..
532,500	,,	,,	10	10%	Do. C	220—222	168—172	..
90,000	10	May 28	9	6/-	South African.	10½—11½	13—14	..
6,609,895	Stk.	Feb. 10	5/4/0	32/-	South Met. 4 p.c. Ord.	111—113	76—78	76—77½
250,000	,,	July 12	—	5%	Do. Pref.	..	93—95	..
1,895,445	,,	July 10	8	8%	Do. 3 p.c. Deb.	72½—74½	55—57	..
234,220	,,	Feb. 26	8½	6%	South Shields Con. Stk.	157—159	114—116	..
962,795	,,	,,	6	3½%	S'th Suburb'n Ord. 5 p.c.	114—116	75—78	..
60,000	,,	,,	5	5%	Do. 5 p.c. Pref.	110—112	75—78	..
135,000	—	—	—	3½%	Do. West Kent	..	..	..
197,558	Stk.	June 26	5	5%	Do. 5 p.c. Deb. Stk.	116—118	85—87	..
647,740	,,	May 14	5	3%	Southampton Ord.	99—102	67—70	..
130,000	,,	Feb. 12	7½	6½%	Tottenham A 5 p.c.	135—138	92—97	..
792,275	,,	,,	6	4%	Tottenham District B 3½ p.c.	115—117	67—69	..
181,255	,,	June 26	4	4%	Tottenham District 4 p.c. Deb.	87—89	61—63*	..
182,880	10	Dec. 30	6	—	Tuscan, Ltd.	5—6	1—2	..
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	45—50	..
236,476	Stk.	Mar. 12	5	5%	Tynemouth 5 p.c. max.	108½—109½	87—88	..
80,000	,,	Feb. 26	8⅜	68/9	Wandsworth, Wimbledon, and Epsom—Wandsworth A 5 p.c.	151—156	90—95	..
255,686	,,	,,	6¾	48/9	Do. B 3½ p.c.	129—134	67—69	..
108,075	,,	,,	5/17/3	44/7½	Do. C 3½ p.c.	110—115	70—75	..
859,000	,,	,,	6¾	42/6	Wimbledon 5 p.c.	117—122	70—75	..
98,000	,,	,,	6⅜	48/9	Epsom 5 p.c.	121—126	72—77	..
88,416	,,	June 26	3	3%	3 p.c. Deb. Stk.	58—60	40—52	..

Ex div.

Motor Spirit Restriction Orders.—The Board of Trade announce that the Motor Spirit Restriction Orders, the operation of which has been suspended until Jan. 10, will be revoked entirely as from that date.

Edinburgh and the Calorific Standard.—The Edinburgh Town Council are opposing the application being made by the Edinburgh and Leith Gas Commissioners to the Board of Trade for power to substitute a calorific standard for the illuminating power standard of the gas supplied. The ground of objection is that it would reduce the illuminating power of the flat-flame burner.

Gas Explosion at Goole.—After the fixing of a new meter in a house at Goole, a strong smell of gas was noticed; and when the occupier entered the house on his return from work, there was an explosion which set fire to some of the things in the room. Trying to pull down the curtains, his wife became enveloped, and was so severely burned as to necessitate her removal to hospital.

Irish Gas-Workers' Strikes.—As the result of a strike of labourers, the Galway Gas-Works were virtually closed-down a fortnight since; the supply being greatly curtailed. Stokers employed by the Skibbereen Gas Company having struck, the town was in darkness. In the former instance, the men demanded the application of the Committee on Production's award, which the employers contended had no reference to ordinary labourers; and in the case of Skibbereen, the demand was for an eight-hour day.

Coleraine Gas Supply Failure.—A failure of the gas supply in Coleraine on Christmas Eve led to no little inconvenience. On the morning of that day, it had been discovered that the stock of gas was much below normal; and throughout the day industrial concerns working on Christmas orders—and specially those depending on gas power to drive machinery—were greatly handicapped. In business houses and private residences oil lamps and candles had to be requisitioned as evening came on. Incidentally, parties and dances were held up, amusements had to be suspended, and publication of the local newspapers was seriously interfered with.

Gas-Works and Armistice Allowances.—A letter was received by the Dundee Gas Committee from the National Union of General Workers, claiming three days' wages as armistice allowance, in accordance with the action taken by the Ministry of Munitions. The Convener (Mr. High) remarked that this was a munitions business, and did not concern them. Mr. Alex. Yuill (the Engineer and Manager) explained that, while the gas-works was a certified undertaking, it was certified as a public utility service, and was different from munition works. The armistice allowance did not affect them in the slightest; and Glasgow held the same views.

While workmen were looking for a fault in the electric cables at Stonefield, Blantyre, and were going down a manhole, an explosion of gas took place. The ignited gas travelled along the cable-ducts to the next manhole, where there was another explosion. Windows in shops and dwelling-houses were blown in.

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments, &c., Vacant.

ACCOUNTANT (India). "India," c/o Streets, Cornhill, E.C.
DRAUGHTSMAN. No. 6560.
FOREMAN FITTER. Redcar Gas-Works.
WORKS FITTERS. No. 6559.
BRASSFINISHERS. No. 6555.
F.A. MACHINE DRIVERS AND LID MEN. No. 6558.

Appointments, &c., Wanted.

ADVANCEMENT (Commissioned Officer R.E.) No. 6561.
COKE OVEN AND BYE-PRODUCTS WORKS MANAGER. No. 6550.
ENGINEER OR GENERAL MANAGER (Large Gas-Works). No. 6557.
REPRESENTATIONS, Compagnie Générale de Constructions Gazières, 335, Rue Basse-Wez, Liege.

Plant, &c., Wanted.

DRUMS AND BARRELS. No. 6563.
DRUMS FOR BENZOL OR PETROL. No. 6556.
SCRUBBER. No. 6562.

Plant, &c., for Sale.

RADIATOR. Johns, 30, East Road, City Road, N. 1.
ROTARY METER. Guernsey Gas-Works.
TANKS. Mein, Stratford

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer—not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders to Alter or stop PERMANENT ADVERTISEMENTS should be received by the FIRST POST on Saturday.

Wanted, For Sale, and Tender Advertisements, Six Lines and under (about 40 words) 3s.; each additional Line, 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."

		ONE YEAR.	HALF-YEAR.	QUARTER.
United Kingdom	Advance Rate:	28/-	15/-	8/8
	Credit Rate:	32/-	16/-	9/6
Abroad (in the Postal Union) Payable in Advance		32/6	17/-	10/-

In payment of subscriptions for "JOURNALS" sent abroad, Post Office Orders or Bankers' Drafts on London only are accepted.
All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C. 4.

Subscribers who desire to avail themselves of the reduction in the Subscription by paying in advance for the Year 1919 are reminded that this can only be done before the end of January.

Telegrams: "GASKING, FLEET LONDON." Telephone: Holborn 6857.

OXIDE OF IRON
FOR SALE OUTRIGHT, OR ON LOAN.

SPENT OXIDE
PURCHASED IN ANY DISTRICT.

GAS PURIFICATION & CHEMICAL CO., LTD.,
PALMERSTON HOUSE,
OLD BROAD STREET, LONDON, E.C. 2.

"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for Gas-Works.
ANDREW STEPHENSON, Gresham House, Old Broad Street, LONDON, E.C. "Volcanism, London."

BRITISH GAS PURIFYING MATERIAL.
ENGLISH BOG ORE AND NATURAL HYDRATED OXIDE OF IRON.
SPENT OXIDE BOUGHT.
BRITISH GAS PURIFYING MATERIALS CO., LTD.
(W. T. P. CUNNINGHAM, Chief Proprietor and Managing Director.)
13, ARCADIAN GARDENS, WOOD GREEN, LONDON, N. 22.
Telegrams: "Bripurimat, Wood, London."
'Phone: Palmer's Green 608.

SPENCER'S Patent Inclined HURDLE GRIDS.
THE very best Patent Grids for Holding Oxide Lightly.
See Illustrated Advertisement, Nov. 19, p. 401.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 45 & 47, Westminster Bridge Road, LONDON, S.E. 1.
WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS AND GOVERNORS.
REPAIRS RECEIVE PROMPT ATTENTION.
Telephones: 815 Oldham, and 2412 Hop, London.
Telegrams—
"BRADDOCK, OLDHAM," and "METRIQUE, LAMB, LONDON."

BENZOL PLANTS FOR GAS-WORKS.
BAGLEY, MILLS, & CO., Ltd., 92, Victoria Street, Westminster, S.W. 1, Invite inquiries from all Gas-Works making 75 million cubic feet and upwards per annum.

ALDER AND MACKAY, LTD.
(ESTABLISHED 1850).
WET AND DRY METERS,
SLOT AND ORDINARY.
STREET LAMPS AND AUTOMATIC CONTROLLERS.
EDINBURGH.
(See p. 726.)

SULPHURIC ACID.
SPECIALLY prepared for the manufacture of SULPHATE OF AMMONIA.
SPENCER CHAPMAN & MESSEL, LTD., with which is amalgamated WM. PEARCE & SONS, LTD., Mark Lane, LONDON, E.C. Works—SILVERTOWN.
Telegrams—"HYDROCHLORIC, FEN, LONDON."
Telephone—1588 AVENUE (3 lines).

OXIDE OF IRON.
SPENT OXIDE WANTED.
BALE & CHURCH, LTD.
33, ST. MARY AT HILL, LONDON, E.C. 3.
Phone: Avenue 6680.

"TORTO" FIRE CEMENT.
BALE & CHURCH, LTD.
33, ST. MARY AT HILL, LONDON, E.C. 3.
Phone: Avenue 6680.

"KLEENOFF," THE COOKER CLEANSER.
Tins for Sale to Consumers.
In Bulk for Works Use.
BALE & CHURCH, LTD.
33, ST. MARY AT HILL, LONDON, E.C. 3.
Phone: Avenue 6680.

MEWBURN, ELLIS, AND PRYOR.
CHARTERED PATENT AGENTS AND TRADE MARK AGENTS,
70, Chancery Lane, London.
Telegrams: "Patent, London." 'Phone: 243 Holborn.
And 3, St. Nicholas Buildings, Newcastle-on-Tyne.

"FERROX." "FERROX." "FERROX."
A BRITISH Oxide Cheaper and Better than Bog Ore. 35 per cent. Water, 75 per cent. Ferric Hydrate.
For Sale outright or on Loan.
OXIDE LIMITED, Brentford, MIDDLESEX.

J. E. C. LORD, Ship Canal Tar-Works, Weaste, Manchester. Pitch, Creosote, Benzols, Toluol, Naphtha, Pyridine, all kinds of Cresylic Acid, Carbolic Acid, Sulphate of Ammonia, &c.

ROBERT DEMPSTER & SONS, Ltd., Contractors for Complete CARBONIZING PLANTS and every Description of GAS APPARATUS, ELEVATING, CONVEYING, and TELPHERAGE PLANTS, also STOKING MACHINERY, ROSE MOUNT IRONWORKS, ELLAND.

SEND your inquiries for Carburetted HYDROGEN AND BLUE WATER-GAS PLANT, also TAR DEHYDRATING PLANT and other GAS-WORKS APPARATUS to—

BALE AND HARDY,
89, VICTORIA STREET, WESTMINSTER, S.W. 1.

SULPHATE OF AMMONIA SATURATORS and all LEAD and TIMBER WORK in connection with Sulphate Plants.

We Guarantee promptness with efficiency for Repairs.

JOSEPH TAYLOR AND CO., CENTRAL PLUMBING WORKS, BOLTON.

Telegrams—"SATURATORS, BOLTON." Telephone 0848.

GAS-WORKS requiring Extensions should Communicate with FIRTH BLAKELEY, SONS, AND CO., LIMITED, Dewsbury, who make a Speciality of Catering for the Smaller Gas Concerns. Prices Reasonable; quality and results, the best. Satisfaction Guaranteed.

THE POLYTECHNIC,
309, Regent Street, W.1.
(CHEMISTRY DEPARTMENT.)
Head of Dept. - - F. E. WESTON, B.Sc., F.I.C.

A Special Course in
COAL-TAR DISTILLATION
will be conducted by
Mr. W. KIRBY, B.Sc.,
commencing on the 6th of January, 1919.
Fee for the Course, 10s. 6d.

For full Particulars, apply to the DIRECTOR OF EDUCATION.

WHEN Filling Vacancies, please REMEMBER THE CLAIM OF THE EX-SERVICE MAN, who, other Qualifications being equal, has the FIRST CALL ON YOUR CONSIDERATION.

THE Compagnie Générale de Constructions Gazières, of Liège, Belgium — a Company engaged in Specializing for Gas Plant— wishes to REPRESENT ENGLISH FIRMS engaged in the Manufacture of Gas-Works Apparatus.

Address all letters to No. 335, Rue Basse-Wez, LIEGE, BELGIUM.

OFFICER (now serving) requires Position as ENGINEER or GENERAL MANAGER of Large Works. Many years' Experience in Construction and Management of Large Gas-Works, Refractory Brick-Works, and Chemical Works. Conversant with best Continental and Colonial Practice. Three years' Experience in Management and Organization of Government Explosive and Munition Factories. Accustomed to Developing new Processes and Industries. Knowledge of Ten Languages. Age 37.

Address No. 6557, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

COMMISSIONED Officer, R.E., Three Years in France (M.C.), previously Pupil and Assistant at Medium-Sized Works, DESIRES ADVANCEMENT. Qualified, all-round Experience, and Excellent References.

Address No. 6561, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

EXPERIENCED Coke-Oven and Bye-Product Works Manager DESIRES CHANGE. Over Ten Years in Present Position. Experienced with Waste Heat and Regenerative Ovens, Sulphate and Concentrated Ammonia, Acid Manufacture, Tar Distillation, Benzol Recovery, and Rectification.

Address No. 6550, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

ACCOUNTANT required for India, in the Office of an Old-Established Company. Salary, £450 per Annum, rising to £550 under a Five Years' Agreement. Free Passages. Applicants must be Single, and not less than 25 Years of Age.

Applications, stating Age and Experience, with copies only of Testimonials as to Character and Qualifications, to be forwarded on or before Friday, Jan. 3, 1919, to "INDIA," care of STREET'S, 30, CORNHILL, E.C. 3.

DRAUGHTSMAN.

WANTED by a Large Gas Company in the Metropolitan Area, Experienced DRAUGHTSMAN. Knowledge of Gas Engineering essential.

Apply, in first instance, by letter, stating Age, Experience, and Salary required, to No. 6560, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

WANTED—Foreman Fitter to Take Charge of Outdoor Department. Must be of Good Address and have had a Thorough Training in all Branches, including Fitting Complaints, Main and Service Laying, &c.

Apply, stating Age, Experience, and Salary required, to the ENGINEER and MANAGER, Gas-Works, REDCAR.

WORKS FITTERS.

A GAS Company in the South of England require Two WORKS FITTERS who have good Knowledge and are Capable of Undertaking all Repairs to Plant, including Stoking Machine, Conveyors, Elevators, and usual Steam-Engines, &c. Applicants must thoroughly understand Electrically Driven Machinery and Gas-Engines. Wages (including War Wage), £3 12s. 6d. per Week of 54 hours, *plus* 12½ p. ct. and the usual Overtime Rates.

Applications, stating Age, Experience, &c., to be sent addressed to No. 6559, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

WANTED—Machine Drivers, preferably Experienced with "F.A."—Wages, 1s. 1d. per hour, *plus* 12½ p. ct. for average 55-hour week; and LID MEN—Wages, 1s. per hour, *plus* 12½ p. ct.

Apply, by letter, to No. 6558, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

BRASS FINISHERS Wanted, used to Indexes and all Classes of Gas-Meter Fittings. Constant Employment and Good Wages.

Apply, by letter, to No. 6555, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

WANTED—Benzol or Petrol Drums, New or Second-Hand. Any quantity up to 500. Capacity, 50 or 100 Gallons. Must be in Perfect Condition. State whether Galvanized or Painted, also type of Construction.

Address No. 6556, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

WANTED—a Second-Hand Scrubber, to pass 1½ to 2 Million c. ft. per diem. London District.

Particulars to No. 6562, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

IRON Drums Wanted, from 50 to 150 Gallons Capacity; also 50 Gallon BARRELS, shaped, Slight Repairs not objected to.

Address No. 6563, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

FOR SALE—Ten Coil Gas Radiator. Price £7.
Mr. JOHNS, 30, East Road, City Road, LONDON, N. 1.

FOR SALE. — Rotary Meter, 7500 c. ft. per hour, 8 in. Flanges. Only used a few days. What Offers?
MANAGER, Gas-Works, GUERNSEY.

TWO Cast-Iron Circular Tanks for Sale, in Sections, Flanged outside, 18 ft. diam., 15 ft. deep, and Two 18 ft. diam., 10 ft. deep; also Twenty Rectangular Open Top W.I. TANKS, from 400 to 2500 Gallons Capacity.
A. MEIN, STATION STREET, STRATFORD, E. 15.

GAS PLANT for Sale.—We can always offer New and Second-Hand Gas Apparatus, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
FIRTH BLAKELEY, SONS, AND CO., LTD., CHURCH FENTON, near LEEDS.

THE GAS LIGHT AND COKE COMPANY.

NOTICE is Hereby Given, that the TRANSFER BOOKS of this Company, SO FAR AS THEY RELATE TO CAPITAL STOCKS, WILL BE CLOSED at Four o'clock p.m., on Tuesday, the 7th day of January next, and will be RE-OPENED immediately after the Ordinary General Meeting of the Company, to be held on Friday, the 7th day of February next.

By order,
WILLIAM LYLE GALBRAITH,
Secretary.

Chief Office,
Horseferry Road,
Westminster, S.W. 1.
Dec. 23, 1918.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MESSRS. A. & W. RICHARDS beg to notify that they hold PERIODICAL SALES BY AUCTION of NEW CAPITAL ISSUED UNDER PARLIAMENTARY POWERS, and of STOCKS and SHARES belonging to EXECUTORS and other PRIVATE OWNERS in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES.

Terms for Issuing New Capital, and also for including other Gas and Water Stocks and Shares in these Periodical Sales, will be forwarded on Application to Messrs. A. & W. RICHARDS, at 37, WALBROOK, E.C. 4.

CARBURINE FOR GAS ENRICHING
ALSO
THE MAXIM PATENT CARBURETTOR.

For Prices, &c., apply to
The GAS LIGHTING IMPROVEMENT CO., Ltd.,
SALISBURY HOUSE, LONDON WALL, E.C.
Telephones: 4451, 4452, 4453, and 4454 London Wall.
Telegraphic Address: "Carburine, London."

TROTTER, HAINES, & CORBETT, LIMITED.
BRETTEL'S ESTATE,
FIRE-CLAY & BRICK WORKS,
STOURBRIDGE.

Manufacturers of GAS RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every Description of FIRE BRICKS.

Special Lumps, Tiles, and Bricks for Regenerative and Furnace Work.

SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

LONDON OFFICE: E. C. BROWN & Co.,
LEADENHALL CHAMBERS, 4, ST. MARY AXE, E.C.

HIGH-PRESSURE DISTRIBUTION

GAS DISTRIBUTION LIMITED
(Late HELM LAMP COMPANY)
can supply
Everything except the Gas.

WELDED JOINTS ARE OUR SPECIALITY.

Queen's Buildings, NUNEATON.

R. LAIDLAW & SON (EDIN.) LTD.
GAS METER MAKERS.

ORDINARY & PREPAYMENT METERS

REPAIRS AND CONVERSION OF ORDINARY TO PREPAYMENT METERS RECEIVE PROMPT ATTENTION.

LONDON & EDINBURGH.

JOHN HALL & CO. OF STOURBRIDGE LIMITED,
STOURBRIDGE,
Manufacturers of
FIRE-BRICKS, LUMPS, TILES,
GAS RETORTS,
And every description of Fire-Clay Goods.

RETORTS CAREFULLY PACKED FOR SHIPMENT.

TELEPHOS
NO BY-PASS
COMPLETE SETS
FROM **11/6** *SUBJECT.*
NEW **1914** MODELS
Apply for New Catalogue to:—
"TELEPHOS"
16/20, Farringdon Avenue, E.C.
BRITISH MADE.
GAS SWITCH

"HOBSIL"
INSULATING BRICKS

9 in. × 4½ in. × 2 in.

Fusion Point, approx. 3000 Fahr.

FOR

Gas Retorts, Ovens, &c.

HOBDELL, WAY, & CO., LTD.

124-7, Minories, LONDON, E. 1.

Telegrams—"Hobnails." Telephones—Avenue 3810 (3 lines).

Price—with Large Sheet Diagram—5s.,

Free by Post in the United Kingdom.

Low Pressure Gas Distribution

A Diagram with a Description of a Rapid Method of Graphical Solution of Problems relating to Mains and Systems of Mains.

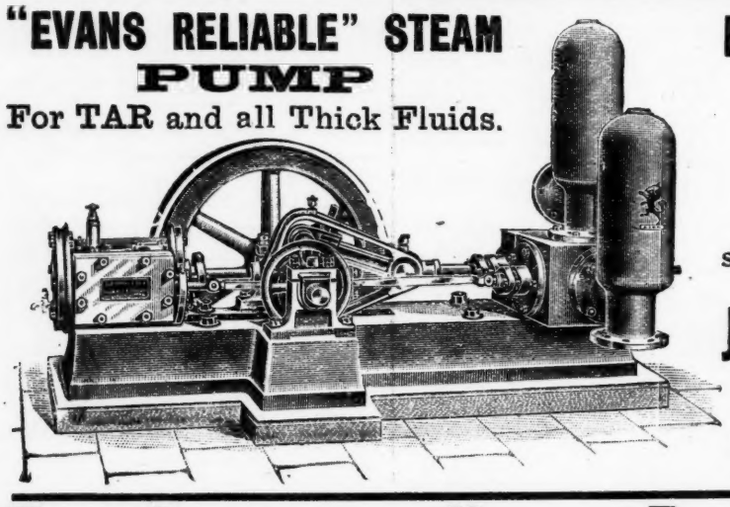
By W. MARSH HAMPTON, B.Sc. (London).

LONDON:

WALTER KING, "Gas Journal" Office, 11, Bolt Court, Fleet Street, E.C. 4.

"EVANS RELIABLE" STEAM PUMP

For TAR and all Thick Fluids.



FIRST AWARDS EVERYWHERE.

Write for No. 8 Catalogue.

Telegrams:
"EVANS, WOLVERHAMPTON."
National Telephone No. 39.

London Office:
SALISBURY HOUSE, LONDON WALL, E.C.

JOSEPH EVANS & SONS,

(WOLVERHAMPTON) LTD.,

CULWELL WORKS,

WOLVERHAMPTON.

THE GLENBOIG UNION FIRE-CLAY CO., LTD.

Manufacturers of the highest grade of Refractory Fire Bricks, specially suited for furnaces subjected to the highest heats and sudden changes of temperature.

All Glenboig Goods are stamped with either "Glenboig" or "Star Works, Glenboig" Brands as under—

REGISTERED

TRADE

MARKS.

The Two Glenboig Brands are identical in quality, and are used indiscriminately in the execution of orders.

GAS RETORTS

HORIZONTAL, INCLINED, & VERTICAL RETORTS to New Standard Specification.
Special Bricks and Blocks for all modern Gas Settings.

Telegraphic Address
"GLENBOIG, GLASGOW."

Glasgow Telephones
Post Office 2120; National 3009.

Coatbridge Telephone
National 25.

58 FIRST AWARDS

At International and Home Exhibitions,

including

Grand Prize at Brussels, 1910.

In every case the Highest Award given for Fire Clay Goods.

Contractors to His Majesty's Home and Indian Governments, and the principal National Arsenals of Europe.
On the Admiralty and War Office Lists.

Works: GLENBOIG, GARTCOSH, and CUMBERNAULD.
Head Offices; 48, WEST REGENT STREET, GLASGOW.

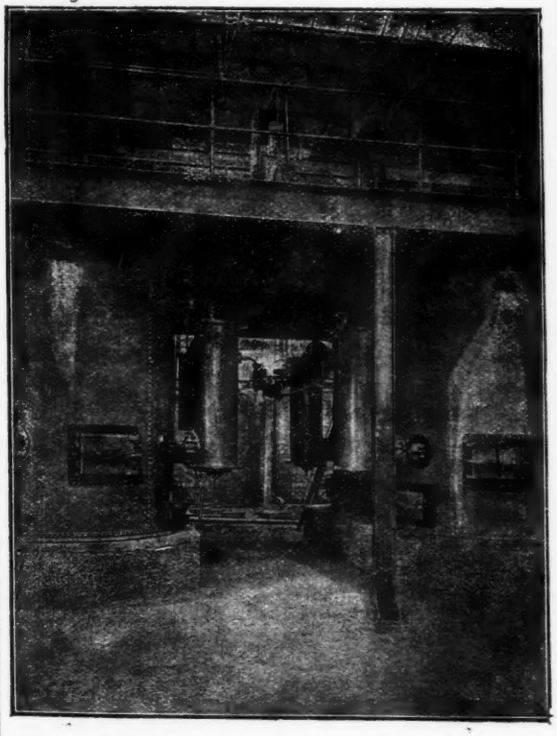
WATER-GAS PLANTS

BLUE OR CARBURETTED

(K. & A. and Smith's Patent.)

Features—

1. Simplicity of operation.
2. Convenience of working to meet sudden fluctuations of demand.
3. Low fuel consumption.
4. Minimum maintenance expense.
5. Efficient gas production of constant quality and low CO_2 content.



Designs, Estimates, and full Particulars on application.

PERRY & Co. (BOW), LTD.,

Engineers and Contractors,

56, Victoria Street, S.W.

Phone—2960 VICTORIA.
8392 "

W. J. JENKINS & CO., LTD.
RETFORD.

See Advertisement last week.

SPECIAL
Rotary Meter

For Coke Oven Gas.
For Blast Furnace Gas
For **FOUL GAS.**

Fullest particulars on application to—
T. G. MARSH, Rotary Meter Co. (1905), Ltd.,
Victoria Works, Whitefield, near MANCHESTER.

GAS COAL AND CANNEL.

WILSON CARTER & PEARSON, LIMITED,

Gas, Steam, and other Fuel for Home and Export,
GAS COKE CONTRACTORS.

Chief Offices: 20A, TEMPLE STREET, BIRMINGHAM.

Telegraphic Address— "CARTER PEARSON, BIRMINGHAM." Telephone Nos.— CENTRAL 3013 and 3014.

ARROL-FOULIS
Stoking Machinery
HYDRAULIC COKE PUSHERS
(HUNTER and BARNETT'S PATENT.)
WILL DISCHARGE A RETORT IN ONE OPERATION
LARGE NUMBERS IN USE.

Full Particulars may be obtained from the Sole Makers,
SIR WILLIAM ARROL & CO., Limited,
GLASGOW.
LONDON ADDRESS: 56, VICTORIA STREET, S.W
(See Advertisement, Dec. 24, p. 678.)

RETORT SETTINGS
WILSON'S (CONT-INT.) VERTICALS
HISLOP'S HORIZONTALS
RENEWALS &
NEW BENCHES
GAS-WORKS ERECTED COMPLETE.
R. & G. HISLOP, Underwood House, PAISLEY

HIGH PRESSURE GAS PLANTS

BOOSTING FANS, ROTARY & RECIPROCATING COMPRESSORS,
DISTRICT & SERVICE GOVERNORS.

GEO. WALLER & SON, LTD., Phœnix Iron-Works, **STROUD, GLOS.**

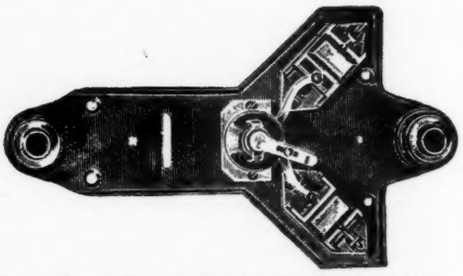
ALDER & MACKAY, Ltd.

THE ORIGINAL MANUFACTURERS OF

Dry Meters in Cast-Iron Cases.

Dry Meter in Cast-Iron Case for 5 Lights.

UNEQUALLED FOR DAMP SITUATIONS.



View of Gas Passage showing the Top Mounting.

The merit of this Meter lies in its simplicity.

The greatest degree of durability is attained with it.

The Gas Passage is in itself unique. It is formed of a single casting, on which the whole top fittings are mounted.

Repairs can therefore be carried out without the aid of skilled labour, without soldering, or use of the blow-pipe.

SPECIALLY SUITED FOR USE WITH GAS ENGINES.

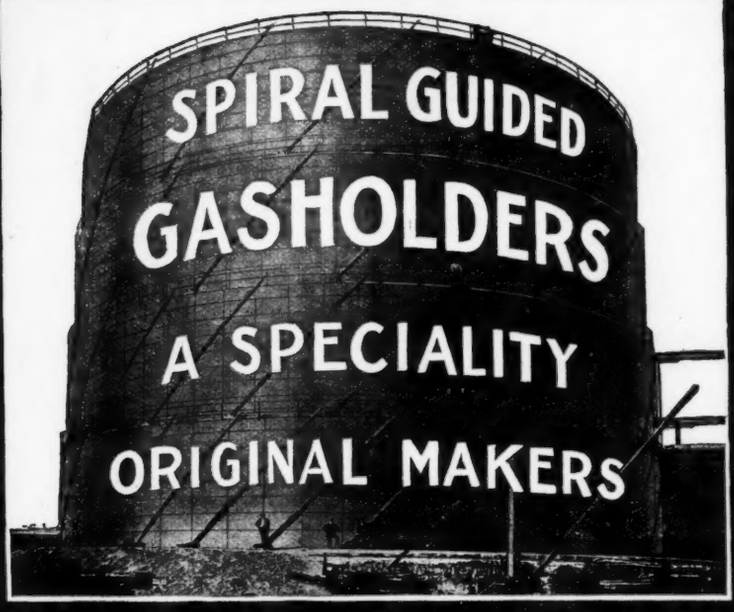
New Grange Works - - **EDINBURGH.**

Telegraphic Address: "ALDER EDINBURGH." Telephone: Central 1481, Edinburgh.

GAS RETORTS AND FIRECLAY GOODS.

"B.B." BEST BRITISH.

MOBBERLEY & PERRY LTD
STOURBRIDGE.



SPIRAL HOLDERS.

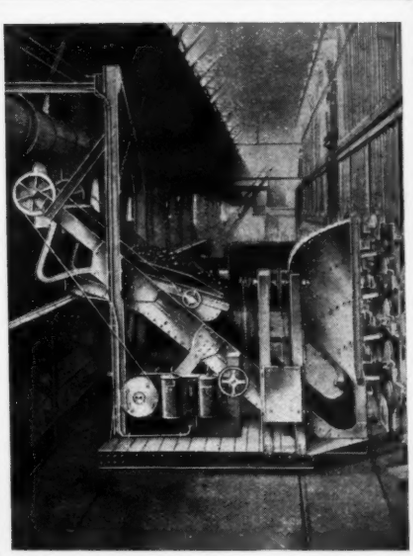
WHEN CONTEMPLATING EXTENSIONS PLEASE ALLOW US TO FURNISH PARTICULARS OF OUR SPECIALITIES

GASHOLDERS AND TANKS OF ANY SIZE AND DESIGN.

CLAYTON, SON & Co LTD. MOOR END, HUNSLET. LEEDS.

LONDON OFFICE, 60 QUEEN VICTORIA ST. E.C.

DONT CONVEY HOT COKE



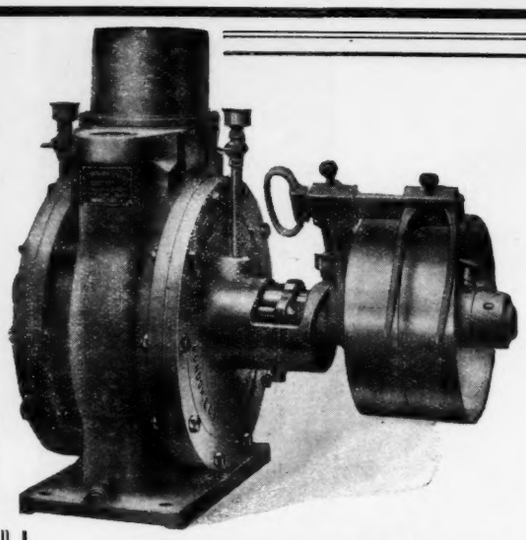
"IDEAL" Patent Hot Coke Transporter.

Comparative Maintenance:

HOT COKE TRANSPORTER LESS THAN 1/4 d. PER TON.

HOT COKE CONVEYOR - 2d. TO 3d. PER TON.

DRAKES LIMITED, HALIFAX ENGLAND.



HOW . . .

High Pressure Gas

IS HELPING THE MANUFACTURER WITH

Industrial Lighting and Heating.

By maintaining a steady and unvarying pressure.

By increasing output and reducing the gas bill.

HIGH PRESSURE GAS IS UNDOUBTEDLY THE MOST EFFICIENT WAY OF LIGHTING FACTORIES, WORKSHOPS, &c., HEATING FURNACES, BLOWPIPES, SOLDERING IRONS, &c.

Let one of our Experts prove it to you.

JAMES KEITH & BLACKMAN Co., Ld.

27, FARRINGDON AVENUE LONDON, E.C. 4.

THE HORSELEY BRIDGE & ENGINEERING Co., LTD.,

TIPTON, STAFFORDSHIRE.

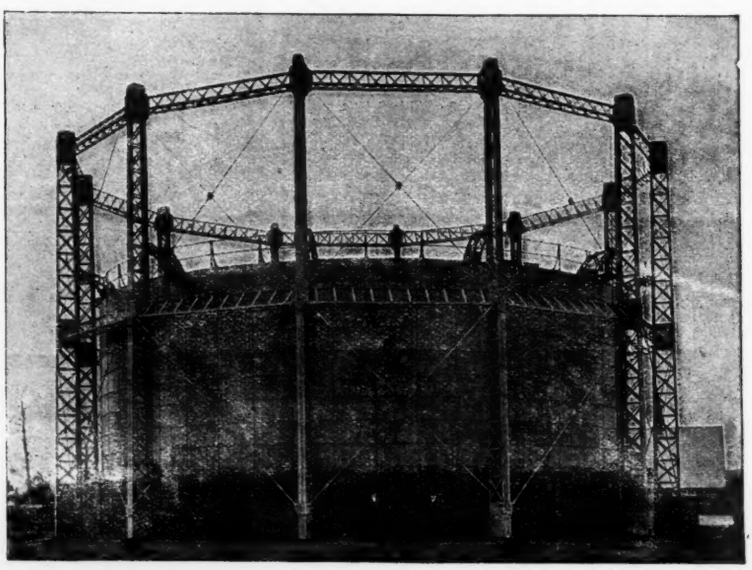
MAKERS — OF — **GASHOLDERS & GAS PLANT.**

PURIFIERS, SCRUBBERS, CONDENSERS, WASHERS, TANKS, VALVES, PIPES, LAMP-PILLARS, RETORT-FITTINGS, CAST-IRON AND STEEL TANKS, PRESSED STEEL FLOORING, ETC.

WORKS & HEAD OFFICE:
TIPTON,
STAFFORDSHIRE.

LONDON OFFICE:
11, VICTORIA STREET
WESTMINSTER.

TELEGRAPHIC ADDRESSES:
"HORSELEY, TIPTON."
GALILEO, LONDON."



ALSO ALL KINDS OF
STRUCTURAL IRON AND
STEEL WORK.
BRIDGES,
ROOFS,
PIERS, ETC.

Printed (at the Chancery Lane Printing Works, Ltd.), for WALTER KING, Publisher, No. 11, BOLT COURT, FLEET STREET, LONDON, E.C. 4.—Tuesday, December 31, 1918.

THE LATEST IMPROVEMENT IN

RETORT HOUSE GOVERNORS

(J. WILSON'S PATENT No. 22,335, 1912.)

Consists of a special form of valve as illustrated, the success of which has been conclusively demonstrated in practice.

OUR RETORT HOUSE GOVERNORS ensure:—

1. An unchanging condition of pressure or vacuum within the hydraulic main.
2. An increased and constant illuminating power.
3. The maximum yield of Gas per ton of Coal.

They reduce the risk of choked ascension pipes and absolutely prevent the danger of reducing the quality of the Gas arising from over-exhausting.

THE ADVANTAGES OF THIS NEW FORM OF VALVE ARE THAT:—

1. The Foul Gas has a direct passage from the inlet to the outlet of the Governor without having to pass through a cylindrical valve.
2. There is only one regulating opening, and consequently no frictional condensation or deposition of tarry matters due to splitting up of the Foul Gases can take place.
3. The graduated opening and the open-ended moving "Reel" ensure perfect regulation, the specially constructed Reel preventing the varying changes of 'Make' and 'Exhaust' disturbing the perfect equilibrium of the Governor.

FURTHER PARTICULARS AND DRAWINGS ON APPLICATION.

W. & B. COWAN

INCORPORATED IN

Parkinson and W. & B. Cowan, Ltd.

FITZALAN STREET WORKS, KENNINGTON ROAD, LONDON, S.E. 11.

Dalton Street Works, Newtown, **MANCHESTER**; Buccleuch Street Works, **EDINBURGH**; The Glasgow Meter Works, 57, John Street, Bridgeton, **GLASGOW**; Hill Street Works, **BELFAST**; Commonwealth Meter Works, Bulletin Place (off Macquarie Place), **SYDNEY, N.S.W.**; 56, a'Beckett Street, **MELBOURNE**; Duncan Street, Fortitude Valley, **BRISBANE**; Ballance Street Works, **WELLINGTON, N. Z.**

THE GAS METER COMPANY, Ltd.,

Manufacturers of

GAS METERS OF ALL KINDS.

Consumers' Wet, Dry, Ordinary or Prepayment Meters, Station Meters, Governors, Gauges, Testing Apparatus.

SIXTY Years' reputation for quality of materials and workmanship still maintained.

LONDON. HEAD OFFICE & WORKS.	OLDHAM. WORKS.	DUBLIN. WORKS.	MANCHESTER. WORKS.
Letters: 238, Kingsland Road,	Union Street,	Hanover Street,	18, Atkinson Street,
Telegrams: "Meterphone, London."	"Meter, Oldham."	"Meter, Dublin."	"Meter, Manchester."
Telephone: Dalston 142.	Oldham 340.	Dublin 1995.	Central 2918.

PUMPS FOR COKE OVENS.

QUENCHER PUMPS.

Specially designed for pumping water containing grit.

Write for List No. 770.

Pulsometer Engineering Co., Ltd.

11, Tothill Street, Westminster, S.W. — Nine Elms Ironworks, Reading.

GASHOLDER PAINTS.

TRADE MARK "SHELL" BRAND REGISTERED.

Purest of the Pure. Best of the Best.

LASTING POWER GUARANTEED EQUAL TO THE DEAREST PAINT QUOTED.

ENAMELS FOR GAS METERS.

ENAMELS (*Special for Outside Wear*) FOR GAS LAMPS AND STANDARDS.

GASTITE for Gas Joints. Up-to-Date Economy.

LUTE BLACK FOR PURIFIERS AND THE INSIDE OF IRON TANKS

SOLE MAKERS—

ARCHD. H. HAMILTON & CO., POSSILPARK, GLASGOW.

MAKERS OF

RAILWAY TANK WAGONS

and

Railway Rolling Stock

Of every Description.

For SPECIFICATION and PRICES apply to the

Midland Railway Carriage and Wagon Co., Ltd.,

Midland Works, BIRMINGHAM.

Telegraphic Address: "Wagon Birmingham." Telephone Nos. 485, 484, & 485 East (3 lines).

London Office: 14 Victoria Street, Westminster, S.W. 1.

Telephone: 3071 Victoria. Telegrams: "Underframe, Vic, Ldn."

Printed (at the Chancery Lane Printing Works, Ltd.), for Walter King, Publisher, No. 11, Bolt Court, Fleet Street, London, E.C. 4.—Tuesday, December 31, 1918.